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# ANNUAL REPORTS.

THE BOARD OF AGRICULTURE
THE PUBLIC GARDENS AND PLANTATIONS
THE ISLAND CHEMIST

*FOR THE YEAR ENDED 31st MARCH 1907.*

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**Ordered by His Excellency the Governor to be Printed.**

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—GOVERNMENT PRINTING OFFICE, KINGSTON.—
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# BOARD OF AGRICULTURE.

## *Report of the Board of Agriculture for year ended 31st March, 1907.*

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SIR,

The Board of Agriculture has the honour to present to your Excellency the following report for the year ended March the 31st, 1907, together with the reports of the Director of Public Gardens and Plantations and of the Island Chemist for the same period.

2. The annual report of the Board for the year ended the 31st of March, 1905 contains in its 96th paragraph an explanation of the relation of the Board to the two Government departments for which the two officers mentioned are respectively responsible. In the present report the method adopted last year has been followed, and the work done under the immediate direction of each of the two departments is included in the report of the head of that department. While these reports are submitted with those of this Board, the latter must not be assumed to endorse all the opinions expressed by Mr. Fawcett and Mr. Cousins respectively, and it should be observed that as regards Part I (analysis) of the Island Chemist's report the work to which it refers is entirely independent of the Board.

3. The operations of the Sugar Experiment Scheme under Law 45 of 1903, as amended by Law 3 of 1906, have been carried on during the past year upon the lines explained in the 99th paragraph of the report of the Board for the year ended the 31st of March, 1905.

4. Under the approved scheme of appropriation of the grant of £10,000, £3,000 was allocated to capital. Of this amount £147 12s. 1d. only remains unexpended, £300 having been spent during the year on taking out patents in various countries for the protection of the High Ether process, as desired by the two planters' associations.

5. The balance to the credit of the fund on the 31st of March, 1907, was £4,212 7s. 1d. which will provide the means of carrying on operations to the 31st of March, 1910.

6. The Island Chemist deals in his report at length with the reception in European markets of rum produced by the High Ether process.

7. It is a matter of regret that the educational work carried on by the Board has been partially and temporarily interrupted by the effects of the Earthquake of the 14th of January. The particulars of this educational work are explained in the reports of the Director of Public

Gardens and the Island Chemist; and the Board is satisfied that it is meeting a real demand and is likely to produce valuable results. The important and popular work carried out by the travelling instructors is dealt with in the report of the Director of Public Gardens.

8. The following is a statement of the transactions of the Sugar Industry Fund for the year:—

### BOARD OF AGRICULTURE DEPOSIT

Statement of the transactions of the Sugar Industry Fund for the year ending 31st March, 1907.

### I.—CAPITAL ACCOUNT.

| —— | Balance at credit, 31st March, 1906. | Expended during 1906-07. | Balance at credit, 31st March, 1907. |
|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. |
| Buildings, fittings and appliances ... ... | 76 1 9 | 0 3 8 | 75 18 1 |
| Alterations and new plant for Estates ... ... | 371 14 0 | 300 0 0 | 71 14 0 |
| Total ... ... | 447 15 9 | 300 3 8 | 147 12 1 |

### II.—ANNUAL EXPENDITURE.

| Items of Estimate. | Estimate. | Expenditure. | Excess. | Saving. |
|---|---|---|---|---|
| Personal Emoluments— | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Fermentation Chemist ... ... | 300 0 0 | 343 11 11 | 43 11 11 | ... |
| Assistant to Chemist ... ... | 70 0 0 | 30 5 9 | ... | 39 14 3 |
| Superintendent of Field Experiments ... | 120 0 0 | 120 0 0 | ... | ... |
| Junior Assistants ... ... | 117 0 0 | 116 5 0 | ... | 0 15 0 |
| | 607 0 0 | 610 2 8 | 43 11 11 | 40 9 3 |
| Other Charges— | | | | |
| Reimbursemet of Travelling Expenses: | | | | |
| (a) Fermentation Chemist ... ... | 50 0 0 | 46 19 8 | ... | 3 0 4 |
| (b) Superintendent of Field Experiments ... | 150 0 0 | 146 4 11 | ... | 3 15 1 |
| Chemicals and apparatus ... ... | 100 0 0 | 109 12 10 | 9 12 10 | ... |
| Manures for experiments ... ... | 60 0 0 | 42 9 1 | ... | 17 10 11 |
| Distillery expenses ... ... | 60 0 0 | 50 19 6 | ... | 9 0 6 |
| Distillery materials from Estates ... ... | 30 0 0 | 0 17 0 | ... | 29 3 0 |
| Repairs and new plant for distillery ... | 30 0 0 | 26 14 0 | ... | 3 6 0 |
| Cane cultivation at Hope ... ... | 50 0 0 | ... | ... | 50 0 0 |
| Training of Distillers ... ... | 100 0 0 | 90 0 0 | ... | 10 0 0 |
| Printing, contingencies and unforeseen ... | 163 0 0 | 114 12 2 | ... | 48 7 10 |
| Special Item— | | | | |
| Passage of S. F. Ashby ... ... | ... | 18 0 0 | 18 0 0 | ... |
| Do. C. Allan ... ... | ... | 18 0 0 | 18 0 0 | ... |
| | 1,400 0 0 | 1,274 11 10 | 89 4 9 | 214 12 11<br>89 4 9 |
| Net Saving ... ... | ... | ... | ... | 125 8 2 |

### SUMMARY.

| Dr. | £ s. d. | Cr. | £ s. d. |
|---|---|---|---|
| To balance at credit of capital account, March 31st, 1906 ... | 447 15 9 | By capital expenditure during 1906-07 ... | 300 3 8 |
| Balance at credit of maintenance account, March 31st, 1906 ... | 5,240 4 7 | Annual expenditure ... | 1,274 11 10 |
| Receipts, etc., during 1906-07 ... | 99 2 3 | Estimated balance at Treasury, 31st March 1907 ... | 4,212 7 1 |
| | £5,787 2 7 | | £5,787 2 7 |

9. The Advisory Committee has continued to give valuable assistance to the Island Chemist in the management of the sugar experiments. The committee consists of the following gentlemen:—Mr. G. D. Murray; The Hon. Lieut. Col. C. J. Ward, C.M.G.; The Hon. W. A. S. Vickers; and Mr. Joseph Shore.

10. The Board has to lament the death of one of its members, Mr. J. W. Middleton, who lost his life in the recent Earthquake. His place has been filled by the appointment of Mr. C. Watson, and the Board now consists of the following members:—The Hon. H. Clarence Bourne, chairman; His Grace the Archbishop of the West Indies; The Hon. the Director of Public Gardens; The Hon. H. H. Cousins, Island Chemist; The Hon. the Superintending Inspector of Schools; Messrs. C. E. deMercado; Geo. D. Murray; C. A. T. Fursdon; and C. Watson.

I have, &c.,

H. CLARENCE BOURNE, Colonial Secretary.

Chairman.

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# PUBLIC GARDENS AND PLANTATIONS.

*Report for year ended 31st March, 1907.*

Department of Public Gardens and Plantations,
Hope Gardens, Kingston P.O., 5th June, 1907.

Sir,

I have the honour to forward for the information of His Excellency the Governor, my annual report as Director of the Department of Public Gardens and Plantations for the year ended 31st March, 1907. I am also Deputy-Chairman of the Agricultural Society of which His Excellency is President; the half-yearly reports are presented at General Meetings of the Society.

The report is divided under the following headings:—

Page.
I. Agricultural Experiment Work— ... ... 3
Sugar canes, tobacco, cassava, cocoa, coffee, citrus, bananas, pine-apples, mangoes, date palms, grape vines, corn, yams, sweet potatoes, cocoes, yam bean, school garden, rubber, vanilla, carob bean, fibre, roads
II. Agricultural Education Work:—
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## I.

## AGRICULTURAL EXPERIMENT WORK.

The work done at the Hope Experiment Station is indicated in the general report below:—

### SUGAR CANES.

The area under experimental canes was extended towards the end of the financial year. This extension, when complete, will cover two acres, making in all 10 acres and 23 perches under canes.

There is a constant and steady demand from planters for tops of B. 208, B. 147, D.95, D.625 and some other varieties, the Superintendent of Field Experiments advising in all cases which varieties should be tried on estates willing to experiment with new and improved kinds.

The area devoted at the station to the growth of such varieties has been increased as much as possible in order to meet the demand for tops.

Cultural operations such as weeding, trashing, moulding, irrigating, &c., were regularly attended to throughout the year.

Manure was carted from Gordon Town for the piece west of the cocoa experiment, and the section west of the tobacco curing house, the soil of these sections being gravelly and poor, and sulphate of ammonia was also applied at the rate of 1 cwt. per acre.

During the distillers' course at the Government Laboratory in October, the poorest canes of the 1904-05, Hope seedlings, which have not yet undergone a field selection, were cut out and carted to the mill to be crushed.

The canes planted in sections I. and II., of the teak-land field for varietal test were cut when ripe, counted, weighed, &c., a 50-lb. sample of each being sent to the Laboratory for analysis, the remaining canes of each variety being carted to the mill at the Laboratory to be crushed.

It may be of interest and useful here to give the history of the Jamaican seedling canes so far raised at Hope Experiment Station.

*1900.*—Seedlings were raised from D 95 & 115.*

*1901.*—About 15 seedlings were raised from seed obtained at the station from D. 95.

All these canes were condemned on first field selection except one, and after further trial this was also condemned and destroyed.

*1901-02.*—Twenty seedlings were raised and planted out this year. The seed-parent of these was also D. 95. At the first field selection the Chemist condemned the lot and they were destroyed.

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* Bulletin of the Botanical Department vol. VII, 10. Oct., 1900, p. 157.

*1902-03.*—During this year about 500 seedlings were raised and planted out. These underwent the first field selection in January, 1904, when all but 90 were condemned and destroyed. Thirty of the most promising of the 90 were planted, the original stools of the 90 being left to ratoon. On a second selection early in 1905, the 90 canes were further reduced to 40, 50 of the number being condemned and destroyed, and samples of the 40 that were retained were sent to the Laboratory for analysis, with the result that the number was still further reduced to 30, viz., (in order of merit), 30, 3, 28, 9, 1, 24, 10, 23, 8, 2, 22, 11, 27, 19, 26, 12, 6, 16, 20, 15, 40, 34, 33, 32, 36, 38, 39, 31, 37. (The numbers run in the following sequence:—1, 2, 3, 6, 8, 9, 10, 11, 12, 15, 16, 19, 20, 22, 23, 24, 26, 27, 28, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40.)

In March, 1906, these 30 varieties were propagated and planted to the fullest extent possible in section III. and IV., of the teak-land field where they are still growing.

The seed-parents of the 30 varieties in this series are as follows:—

From D. 51—Nos. 1, 2, 3, 6, 8, 9, 10, 11, 12, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40.
" D.115—No. 15.
" D. 80—Nos. 19, 20.
" D. 95—Nos. 22, 23 24.
" D. 99—Nos. 26, 28.
" D.102—Nos. 16, 27, 30.

*1903-04.*—Seedlings to the number of 2,750 were successfully raised and planted out. In the early part of 1905 these canes underwent a rigid field selection with the result that only 100 were left in the field, the remainder being dug out and destroyed. In the early part of 1906 the 100 seedlings were further examined and 70 were discarded, the 30 retained (Nos. 40 to 70) being propagated to the fullest extent and planted west of the tobacco curing house, and the original stools dug out and destroyed.

Samples of the plant canes were forwarded to the Laboratory in March, 1907, for analysis, with the result that the following 15 numbers were condemned by the Chemist:—41, 43, 44, 45, 51, 53, 54, 55, 62, 63, 65, 66, 67, 68, 69.

The numbers retained for further trial are 42, 46, 47, 48, 49, 50, 52, 56, 57, 58, 59, 60, 61, 64, 70.

Of these canes the Chemist reports, that three or four of the retained varieties are magnificent, number 48 being one of the best canes on record.

About 100 holes each of numbers 48, 56, 64, 47, and 52 will be planted, numbers, 42, 46, 49, 50, 57, 58, 59, 60, 61, 70, being simply left to ratoon.

The seed-parents of the 1903-04 canes are as follows:—
From Mount Eagle Estate, Westmoreland—Nos. 41 to 66.
From D.109 at Hope Experment Station—Nos. 67 to 70.
It may be mentioned here that tops of the following canes were sent to Mr. Burgess, Mount Eagle Estate, in April, 1902, to be planted amongst his rows of White Transparent, in the hope that cross-pollination would take place:—B. 208, B. 156, B. 306, B. 347.

*1904-05.*—2,650 seedlings were raised and planted out in the land west of the cocoa experiment from which the previous year's seedlings had been removed. About half these canes, in the western portion of the plot were very poor, and have already been dug out, and the remainder of the set will soon undergo a careful field selection. These canes were raised partly from seed received from Mount Eagle Estate, and partly from seeds collected at Hope Experiment Station. The seed parent of each is recorded and will be given when the canes are finally selected and numbered.

*1905-06.*—Forty boxes of cane seeds were sown this year but they were almost a total failure, only 150 seedlings being raised and planted out in the piece west of the cocoa experiment This is not at all a promising set, and it is likely that all will be condemned when carefully examined in the field.

The seeds of these seedlings were collected at the Experiment Station, none being received from the country.

*1906-07.*—The seedlings for this year, a very fine lot, are still in the seed boxes and will soon be potted up.

*Expenditure.*—The cost of cane cultivation was £83 0s. 9d.

*Exports.*—The exports of sugar and rum as compared with the previous year are as follows

Sugar.

| Countries to which exported. | | 1906-7. | 1905-6. |
|---|---|---|---|
| United Kingdom | ... | 2,911 tons | 3,540 tons |
| United States | ... | 55 " | 63 " |
| Canada | ... | 9,847 " | 7,885 " |
| Other Countaies | ... | 1,158 " | 1,035 " |
| | | 13,971 " | 12,523 " |

Rum.

| Countries to which exported. | | 1906-7. | 1905-6. |
|---|---|---|---|
| United Kingdom | ... | 1,252,489 galls. | 848,901 galls. |
| United States | ... | 4,091 " | 3,015 " |
| Canada | ... | 66,682 " | 53,205 " |
| Other Countries | ... | 164,686 " | 181,515 " |
| Total | ... | 1,487,948 " | 1,086,636 " |

## TOBACCO.

*Tobacco, Havana.*—The area planted witn tobacco for the 1906-7 crop was one acre. Half of this was grown in the old tobacco field in the Experiment Station and half in a fresh piece of land south of the Water Works conduit which was cleared for the first time during the year.

The plants were put out from 31st October to the end of November, and from the latter date to the end of the financial year the rainfall only amounted to 2·21 inches distributed over 17 days.

The crop consequently suffered and will be a light one. The principals were cut in January and February and are still in process of curing.

The distances allowed in planting were 2½′ x 15.″ It is found in practice that these distances allow the use of the cultivator for as long as necessary without fear of injuring the leaves.

The crop of 1905-6 the curing of which was completed during the year under review yielded as follows:—

| | | | |
|---|---|---|---|
| ¼-acre, planted 3′ × 15″— | | | |
| Carpa ... | | ... | 54 lbs. |
| Tripa ... | | ... | 28 " |
| Fonque ... | | ... | 12 " |
| Cost of cultivation and curing | £2 3 11 | | |
| ¼-acre planted 2′ × 15″— | | | |
| Carpa ... | | ... | 39 " |
| Tripa ... | | ... | 24 " |
| Fonque ... | | ... | 10 " |
| Cost of cultivation and curing | 3 1 11 | | |
| ¼-acre planted 15″ × 15″— | | | |
| Carpa ... | | ... | 21 " |
| Tripa ... | | ... | 24 " |
| Fonque ... | | ... | 23 " |
| Cost of cultivation and curing | 2 12 6 | | |
| Total cost of Havana crop, 1905-06 ... | | £7 18 4 | |

The weather experienced during the growth of this crop was most unfavourable for the cultivation of tobacco.

Just after planting there was so much rain that it was impossible to attend to cultivation and moulding at the right time; then after cutting the principals the weather became so hot and dry that very few ratoons were produced, consequently the crop is below the average.

*Tobacco Sumatra*—The experiment of growing Sumatra tobacco under shade cloth being considered complete, and as results equally as good have been obtained with tobacco grown in the open, ¼-acre plot of Sumatra for 1906-07 crop was planted on 29th October in the open, in a part of the fresh land planted with Havana.

With the exception of being grown in the open the plants have been treated in exactly the same way as those previously grown under shade. The long-continued drought has seriously affected the crop and the yield of this will also be much below the average.

The crop is in process of curing.

The yield, and cost of cultivation of the 1905-06 crop of Sumatra were as follows:—

*Grown in the open.*

| | | | |
|---|---|---|---|
| 1-8th acre, planted 3′ × 15″— | | | |
| 1st quality ... | | ... | 52 lbs. |
| 2nd " ... | | ... | 10 " |
| 3rd " ... | | ... | 8 " |
| Cost of cultivation and curing | £1 1 1½ | | |
| 1-8th acre, planted 2′ × 15″— | | | |
| 1st quality ... | | ... | 25 " |
| 2nd " ... | | ... | 4 " |
| 3rd " ... | | ... | 8 |
| Cost of cultivation and curing | 1 8 3 | | |

| | | |
|---|---|---|
| 1-8th acre, planted 15″ × 15″— | | |
| 1st quality ... ... | | 32 lbs. |
| 2nd " ... ... | | 9 " |
| 3rd " ... ... | | 15 " |
| Cost of cultivation and curing | 1 10 9½ | |
| ¼-acre *Shade grown Sumatra.* Planted 3′ × 18″— | | |
| 1st quality ... ... | | 42½ " |
| 2nd " ... ... | | 13 " |
| 3rd " ... ... | | 24 " |
| Cost of cultivation and curing | 5 17 6½ | |
| Total cost of Sumatra tobacco, 1905-06 crop | £9 17 8½ | |

*Tobacco Dust as Fertilizers and Insecticide.*—An important article on this subject by Mr. G. L. Lucas appeared in the Bulletin for August, 1906.

*Exports.*—The exports for the year as compared with the previous year, are as follows :—

Cigars.

| Countries to which exported. | | 1906-7. | 1905-6 |
|---|---|---|---|
| United Kingdom | ... | 6,585 lbs. | 8,654 lbs. |
| United States | ... | 926 " | 348 " |
| Canada | ... | 583 " | 797 " |
| Other Countries | ... | 35,224 " | 29,211 " |
| Total | ... | 43,318 lbs. | 39,101 lbs. |

Cigarettes.

| | | | |
|---|---|---|---|
| United Kingdom | ... | 8 lbs. | 114 lbs. |
| United States | ... | ... | 20 " |
| Canada | ... | ... | ... |
| Other Countries | ... | 1,917 " | 10,736 " |
| Total | ... | 1,925 " | 10,870 " |

Leaf Tobacco.

| | | | |
|---|---|---|---|
| United Kingdom | ... | 709 lbs. | ... |
| United States | ... | 2,369 " | 2,394 lbs. |
| Canada | ... | 294 " | ... |
| Other Countries | ... | 36,092 " | 4,974 " |
| Total | ... | 39,464 " | 7,368 " |

## CASSAVA.

*Native varieties.*—The experiment of planting out cassavas in February and March, 1906, on banks run up by the plough has not, owing to drought, done nearly so well as was expected. The land in which some of them were planted is required for the extension of experimental cane cultivation and the cassavas, at the end of the year, were being removed from the ground, 50 lbs. of average tubers of each variety being sent to the Laboratory for analysis.

*Colombian varieties*—One-quarter chain plots of all the Colombian varieties were planted for varietal test, and 50 lbs. of average tubers of these were also being sent to the Laboratory at the close of the financial year, for the purposes of being analysed. The results of the analysis will, when available, be published in the Bulletin.

The cost of cassava cultivation for the year was £43 8s. 10½d. The tubers not required for analysis were sold and realized £2 14s., and a collection of cuttings of the Colombian varieties sent to the Bahamas realized £25.

## COCOA.

The trees in the one-acre plot of cocoa planted in 1903 at various distances apart are doing well and some of them are now bearing pods.

The plot was regularly cultivated, mulched, and irrigated when necessary, and the trees were pruned.

The young foliage of some of the trees was attacked by catapillars and a spray of arsenate of lead was used with satisfactory results.

*Arriba Cocoa.*—After repeated attempts to get seeds of this valuable variety of cocoa in good order from Ecuador, but without success, His Britannic Majesty's Consul at Guayaquil sent up a small box of seedlings which arrived in good order. These have been distributed to cocoa planters throughout the island and 6 have been planted at Hope and 6 at Castleton Gardens, the plants in each case being put out quite away from other varieties of cocoa to prevent cross-pollination. "Summer Arriba" is quoted at 93s., while "fermented Jamaica" is only 80s.

*Budded Cocoa.*—The old trees that were budded in 1904 are doing well and are now fruiting.

*Expenditure*—The cost of cocoa cultivation for the year was £4 1s. 6d.

*Exports.*—There is an enormous increase in the export of cocoa, which shows that the exertions of the Department and of the Agricultural Instructors in pushing the cultivation, have been successful.

| Countries to which exported. | | 1906-7. | 1905-6. |
|---|---|---|---|
| United Kingdom | ... | 28,222 cwt. | 12,681 cwt. |
| United States | ... | 9,911 " | 4,797 " |
| Canada | ... | 1,959 " | 2,694 " |
| Other Countries | ... | 9,965 " | 12,415 " |
| Total | ... | 50,057 " | 32,587 " |

## COFFEE.

*Coffee arabica.*—The experimental plantation of coffee has been regularly cleaned, mulched, and irrigated when necessary. The bushes were pruned in due season, and the crop gathered and weighed. The coffee is grown chiefly as a means of training apprentices, &c.; but various experiments are carried out at the same time; for instance, some coffee trees are planted under the shade of a leguminous tree (the guango), others under the shade of a non-leguminous tree (breadnut), and others again alternately with the Anchovy Pear, which does not give any shade.* Some of the trees are pruned low, called "short-top" coffee, and some are allowed to run up, "long-top" coffee. The crop from each tree has been carefully weighed during the last five years; the average weight in cherry per tree per annum is under guango for short-top, 21lbs. 10 ozs., for long-top 17 lbs. 14½ozs.; under Breadnut for short-top 7lbs. 0½ oz., for long-top 3lbs. 13½ ozs.; under Anchovy Pear for short-top 15 lbs. 6½ ozs., for long-top 12lbs. 14½ oz.

So that it appears that shade increases yield at the elevation of Hope Gardens, that the shade given by a leguminous tree gives the best results, and that coffee pruned low pays better than allowing the trees to run up.

*Exports.*—The exports of coffee are a measure of continued low prices:—

| Countries to which exported. | | 1906-7. | 1905-6. |
|---|---|---|---|
| United Kingdom | ... | 10,729 cwt. | 12,085 cwt. |
| United States | ... | 10,202 " | 16,967 " |
| Canada | ... | 1,242 " | 1,711 " |
| Other Countries | ... | 27,503 " | 53,147 " |
| Total | ... | 49,676 " | 83,910 " |

## CITRUS.

The citrus groves are in a good state of cultivation. They have been regularly cleaned, cultivated, mulched and irrigated, and the trees have been sprayed for scale insects.

The experiment recommended in the Bulletin for April, 1906, to secure early crops of fruit is being tried.

1. All the fruits were removed from the trees the 1st to the 10th November.
2. The soil was removed from the main roots, 12th to 20th November.
3. Ploughed through the grove at end of November as recommended by Dr. Tillman.
4. Mulched the trees in January, and started irrigating, and continued irrigation to end of year under review.

The trees blossomed profusely and have set good crops of fruit which will be thinned later on.

*Expenditure.*—The cost of cultivation for the year was £18 16s. 5d.

*Export.*—The export of oranges and grape fruit are as follows:—

### Oranges.

| Countries to which exported. | | 1906-7. | 1905-6. |
|---|---|---|---|
| United Kingdom | ... | 26,088,770 no. | 20,796,330 no. |
| United States | ... | 18,566,610 " | 43,908,613 " |
| Canada | ... | 9,557,139 " | 7,421,350 " |
| Other Countries | ... | 547,485 " | 565,200 " |
| Total | ... | 54,760,004 " | 72,691,493 " |

### Grape Fruit.

| Countries to which exported | | 1906-7. | 1905-6. |
|---|---|---|---|
| United Kingdom | ... | 9,541 brls. | 7,857 brls. |
| United States | ... | 18,839 " | 16,400 " |
| Canada | ... | 2,954 " | 2,941 " |
| Other Countries | .. | 214 " | 258 " |
| Total | .. | 31,548 " | 27,456 " |

## BANANAS.

The collection of varieties and the experimental plots have been regularly cleaned, forked mulched and irrigated.

Large numbers of stems were blown down by high winds in March.

---

* Guango (Pithecolobium Saman); Breadnut (Brosimum Alicastrum); Anchovy Pear (Grias cauliflora

*Expenditure.*—The cost of cultivation for the year was £9 19s. 8d.

*Export.*—The export is still steadily increasing :—

| Countries to which exported. | | 1906-7. | 1905-6. |
|---|---|---|---|
| United Kingdom | ... | 1,239,500 stems. | 1,125,081 stems. |
| United States | ... | 14,505,911 " | 13,567,085 " |
| Canada | ... | 102,007 " | 54,869 " |
| Other Countries | ... | 172 " | 1,607 " |
| Total | ... | 15,847,590 " | 14,784,642 " |

## PINE–APPLES.

The seedlings mentioned in last year's Report as having been treated as *suckers* have nearly all fruited. Some of the fruits were handsome in appearance, well flavoured and of good size and weight, and suckers from the plants which produced such fruits have been planted out for further trial. All plants which produced inferior fruits were destroyed.

The seedlings raised in 1904-05 which were planted out at 9 inches and the seedlings of 1905-06 have been planted at 18 inches apart. Nothing is gained by first planting at 9 inches apart and later on disturbing the seedlings to re-plant at 18 inches apart, but on the contrary a distinct check in growth is the result.

During the year under review arrangements were made, with the permission of the proprietor, Mr. Geo. L. Lucas, to carry on the work of cross pollinating at the extensive Pine-apple plantation at Norbrook. The crosses attempted were between red and green Ripleys and the red Spanish and vice versa, A large number of crosses was made and the fruits marked but unfortunately nearly all these fruits were cut in mistake by the employees during the absence of the proprietor, and the very few seeds that we secured failed to germinate.

The experiment will be repeated during the coming season, and as Mr. Lucas is himself very much interested in these crosses we may reasonably hope to secure a good supply of seeds.

Beds were prepared and the general collection of Pine-apples was re-planted during the year.

*Expenditure.*—The cost of this cultivation for the year was £16 9s. 8d.

## MANGOES.

The seedlings planted out as stocks for budding purposes are doing well and many of them have been budded, principally with the variety known as "Bombay".

Mr. Geo. L. Lucas presented a plant of the celebrated Mulgoba variety and this has been put out. Mr. E. Gale of Florida kindly presented some bud-wood of the same variety and we have succeeded in getting one bud to grow.

Two plants each of Ceylon No. 1, Fifine Gabriel and Julie received from the Botanic Station, Dominica, in June, 1905, have been planted out and are doing well, as also are the two plants of Rupee mango received August 1905, through the Royal Gardens, Kew, from Lady Blake, Ceylon.

The following is a list of varieties now in our collection :—

| Number or Name of Variety. | | Whence received and date. |
|---|---|---|
| Nos. 1, 2, 3, 4, 5, 6, 10, 12 | | From Castleton Gardens.<br>These are varieties imported from India in 1869 and planted at Castleton which is not a suitable district for the mango, being too damp. |
| Madras | | |
| Bombay | | |
| Bhadoorea | | |
| Mexican | ... | From Mr. Jno. McLean, Cold Spring. |
| Alphonse or Afooz (7) | ... | From Col. J. G. Griffith. Hodges Pen, 1898. |
| Governor | ... | From Mr, W. L. Mudon, Kingston, Oct., 1891. |
| Martin | | From Botanic Gardens, Martinique, July, 1898. |
| Julie | | |
| Prince George | ... | From King's House Garden, March, 1902. |
| Peters | | From Botanic Gardens, Trinidad, January, 1905. |
| DeBoissiere | | |
| Julie | | |
| Peach | | |
| Ceylon No. 1 | | From Botanic Station, Dominica, June, 1905. |
| Fifine Gabrielle | | |
| Julie | | |
| Manila | ... | Buds from Mr. Dugald Campbell, Linstead, June, 1905. |
| Rupee | ... | Through Kew from Lady Blake, Ceylon, August, 1905. |
| Kavasji-Patel | ... | Bud-wood from the Supt. Victoria Gardens, Bombay, October, 1905. |
| Mangalore | | Bud-wood from Mr. Aston W. Gardner, Kingston, December, 1905. |
| Wastara | | |
| Mazagon | | |
| Un-named | | |
| Mulgoba | ... | From Mr. Geo. L. Lucas, Constant Spring, August, 1906. |
| Robin | ... | Bud-wood from Mr. Wm. Wallace, Manchester, August, 1906. |
| Mulgoba | ... | Bud-wood from Mr. E. Gale, West Palm Beach, Florida, September. 1906. |

*Expenditure.*—The cost of Mango cultivation for the year was £6 8s. 10d.

*Preserves.*—Mr. G. L. Lucas of Norbrook, near Constant Spring, used several thousands of the fruits of Number Eleven, Beef, and Yam Mangoes in his canning factory in his first season, making "Sliced Mango in Syrup," "Mango Jelly," and "Mango Jam."

Mr. Lucas preserves pine-apples also. His output for the season was 48,560 packages or cans, some 2 lbs. and some 1 lb. in weight of 14 different kinds of native fruits. He expects to make two or three times as much during next fruit season and use glass jars instead of tins.

### DATE PALMS.

The trees have been regularly cultivated and irrigated. They were also sprayed when necessary with Bordeaux mixture to keep the Date fungus (Graphiola phoenicis) in check.

Eight of the trees flowered during the year, four being males and four females. The latter were pollinated and produced very fine clusters of fruits, but unfortunately heavy rains fell during the period of ripening and the larger portion of the fruits never ripened properly.

Suckers were distributed as follows ;—

| | | |
|---|---|---|
| Mr. Hugh Ramsden, Bellfield, Hampden | ... | 6 |
| Major Hardyman for Up-Park Camp | ... | 6 |
| Castleton Gardens | ... | 6 |
| The General Penitentiary, Kingston | ... | 4 |
| Mr. H. S. Hoskins for Drax Hall Estate | ... | 2 |

Cost of cultivation £3 9s. 5d.

### GRAPE VINES.

The vines produced a few small bunches of grapes, but as they were getting diseased they were removed.

The cultivation, mulching and watering of the border were regularly attended to, and the vines were pruned in February.

### CORN (MAIZE.)

The tobacco land, after the crop was harvested, was planted with corn as a catch-crop and the yield was 17 bushels from ¾ acre. This was sold at the current rate, 6/10 per bag of 2 bushels.

The cost of cultivation was £2 1s. 6d.

### YAMS.

As much confusion exists in the botanical nomenclature of yams (Dioscorea spp.), a few hills of every kind that could be obtained were cultivated with the hope that flowering specimens would be procured for study ; only two, however, produced flowers, but typical leaves and stems of all were obtained.

The cost of cultivation was 5s. 4d.

### SWEET POTATOES.

Plots of the best varieties have been grown for the supply of cuttings to applicants, and 46,283 cuttings were distributed.

2,150 lbs. of tubers were supplied to the Hope Industrial School, and 204 lbs were otherwise disposed of.

A collection of 36 varieties was received from Dr. John McFarlane, University of Pennsylvania, U. S. A. They are as follows:—Kamelo, Philipili, Kala, Norton, Red Jersey, Florida, Pepper's Choice, Bronze Spanish, Southern Queen (strong type), Southern Queen (weak type), Early General Grant, Picotea, Key West, Alabama, Up River, Red Nancemond, Kapo, White Gilkes, 3 months, Georgia, Caroline (extra early), Thumai, Caroline Lee, Nancy Hall, Van Ness Red, Yellow Jersey, Peabody, Shanghai, White Sealy, John Burnet, Strausberg, Belmont, Pumpkin, Yellow Red, Black Spanish, Kanaheahe, India Red.

These were all small tubers and have been planted out for propagating purposes.

The cost of cultivation for the year was £4 7s. 6d.

### COCOES, OR TANIERS.

The plot containing the collection of varieties was kept in good order during the year, but unfortunately the land where they are growing cannot be freely irrigated and the plants suffered for want of water during the drought from December to end of March, They will be removed to a more suitable plot of ground during next planting season. This crop requires a good share of moisture, and during long spells of dry weather irrigation must be resorted to.

The cost of cultivation was 6s. 10d.

### YAM BEAN.

(*Pachyrhizus tuberosus.*)

A small trial plot of this food plant was grown and a sample of the tubers was sent to the Laboratory for analysis, with the following results:—

| “ Analysis. | | Per cent. |
|---|---|---|
| Moisture | ... | 69·43 |
| Solids | ... | 30·57 |
| Starch | ... | 17·73 |
| Sugars | ... | 2·86 |
| Nitrogen | ... | 0·42 |

“ Inferior to Sweet Potato in feeding value.”

The cost of cultivation was 15s. 2d.

### SCHOOL GARDEN.

The school garden of ¼ acre for teaching purposes has been kept in good order by the apprentices at the Experiment Station, and by the boys from the Industrial School. In addition to the permanent crops of citrus, cocoa, pine-apples, &c.. small crops of tobacco, cotton, corn, peas and various vegetables have been successfully grown.

The cost of upkeep was £4 13s. 4d.

### RUBBER.

The plants of Para rubber put out last year are making satisfactory growth, and it has been found that, when once established, this tree stands drought better than almost anything else. This has also been the experience of other growers, cocoa trees have died and bananas have withered but Para rubber plants in the same field have flourished.

Twenty-nine plants of Funtumia elastica were put out on the east and west sides of the cocoa experiment-plot.

The cost of cultivation was £2 5s.

### VANILLA.

The plantation of vanilla has made excellent progress. It has simply been hand weeded occasionally so as not to injure the roots of the plants, regularly mulched and irrigated.

At the end of the year the vines were flowering profusely and the work of pollinating was in progress. A small crop of beans will be cured during the ensuing year.

The cost of cultivation for the year was £17 6s. 9½d.

### CAROB BEAN.

(*Ceratonia Siliqua.*)

In January 1905, we received a consignment of seeds of Carob beans from Messrs. Dammann & Co., near Naples, Italy. The seeds were sown and in the following May the plants were distributed, twelve seedlings being put out in the Economic Collection at the Experiment Station and they have done well, some of them being now quite 8 feet in height.

Those put out at Castleton and other places at the same time have made poor growth showing that this is another tree that succeeds best on the comparatively dry, hot plains.

### FIBRE.

Mr. Keith Fisher has imported a machine for extracting the fibre from Sisal Hemp leaves. He has been allowed to cut all the leaves he required on the Hope Experiment grounds, and it will be interesting to know how the fibre turns out. It is found that most of the leaves cut were not ripe, and consequently the quality may not be as good as it might be. Large numbers of suckers have been supplied to him and others.

An application has been received from a firm in Boston, Mass., for a sample of pinguin leaves (Bromelia Pinguin) to make a trial of it for making paper, Wood pulp is within measurable distance in the United States and Canada of becoming exhausted, and if pinguin fibre is suitable for paper stock, large tracts of land now covered with pinguin and of no value, may prove a source of income to the owners.

### ROADS.

The roads through the Experiment Station have been kept clean and in good order. A new piece was formed to connect the northern boundary road with one of the main roads running east and west; and a new pathway was made through the coffee plantation.

The cost of extensions, repairs and upkeep for the year amounted to £20 6s. 7½.

## II.

## AGRICULTURAL EDUCATIONAL WORK.

### TRAINING AT HOPE EXPERIMENT STATION.

The instruction of various classes of students has been carried on as before by Mr. N. Rudolf until the 24th May when he resigned, then by Foreman Taylor pending the appointment of an Agricultural Instructor and Assistant Superintendent.

*Hope Industrial Boys*—The industrial school boys are engaged 4½ hours a day, working in the garden, digging, forking, applying manure, weeding, sowing seeds, caring seedlings, transplanting, budding grafting, pruning, using insecticides, &c. They receive half an hour's instruction every day in the principles underlying agricultural practice, and the application of these principles. This is a continuation of similar training that has been carried on for many years.

*Hope Apprentices*—Instructions and practical demonstrations are giving in budding, grafting, circumposing, and the propagation of plants generally, tillage, labour, &c., lectures and demonstrations in the various crops of the Island, such as Tobacco, Sugar, Cane, Coffee, Cocoa, Bananas, Cotton, Citrus, Pine-apples, Vanilla, and Vegetables.

The following is a list of men who have been trained in the Garden, and a note of their present positions :—

S. L. Parkinson, Asst., Plantations, Bayeux, Hayti
— Stoddart. Teacher, Craighton School
T. B. Dawodu, Asst., Curator, Bot. Station, Lagos
F. G. Leigh, Lagos, W. Africa
J. S. Martinson, Asst., Curator, Accra, Gold Coast
E. A. Brew, Aburi, Gold Coast
James Hartley, Asst., Bot. Station, Sierra Leone
T. Christy, Knockalva Pen, Hanover
G. Lyons, (deceased) was employed on various estates budding citrus
J. Taylor, Robin's Hall, Devon
A. Burke, Bath
A. Oliphant. worked in King's House Gardens, now in U.S.A.
S. Lockett, on his own property, Red Hills
J. A. S. Hawkins, (late Mynhador (Supt.) to Messrs. Stewart, Thomas, & Co., Colombia), growing coffee for Señor Menet Jiracosoca, Colombia
W. E. Blaine, J. O. Mason, Esq., Layton Valley
A. Dixon, on his father's property, Port Royal Mountains
E. Willis, J. Farquharson, Esq., Latium, Montego Bay
H. Stephenson, Miss Morris, Highgate
F. L. Alberga, book-keeper, Solidad Estate, Guantanmo, Cuba
H. C. Thomas, cultivating his own place, Caledonia Pen, Old Harbour
P. Grant, at Montpelier Pen
J. Salmon, cocoa grower with H. B. Consul, Baranquilla
G. Campbell, Colon
T. B. Burke, Banana Planter, Port Limon
A. Adamson, Book-keeper, Phœnix Estate, Hanover
I. Dowden, New York, U.S.A.
J. Francis, (I.S.), Bocas del Toro
A. Turpin, Camaquez (Puerto Principe) Cuba
L. A. Jarvis, Foreman, Experiment Station, Nassau, Bahamas
A. Robins, Book-keeper, Banana Plantation, Port Limon
C. Brown, Gardener to Mr. Jeykes, Pine Island, Cuba
C. Berry “ A. C. Harrison, jr., Ensenda de Mora, Cuba
G. Claypole “ “ “ “ “
C. Nicholas, Guantanamo, Cuba
P. A. Lawson Edie, (At Hope for a short period) United Fruit Co., Banes, Cuba.

*Laboratory Students*—The Laboratory Students attend once a week on Thursdays and every alternate Wednesday from 7 a.m. to 9.30 a.m., and are given lectures and demonstrations on the cultivation and curing of various economic products in the Island, including Sugar Cane, Seedling Canes, Tobacco, Coffee, Cocoa, Bananas, Cotton, Citrus, Pine-apples, Vines, Vanilla, Cassava, and Vegetables. The class was discontinued after the Earthquake.

*Elementary School Teachers*—The Annual Course of one month of agricultural instruction to elementary school teachers, given at Hope Experiment Station and at the Mico Training College commenced on the 28th December, 1906, but came to an abrupt termination on the 14th January, owing to the disastrous earthquake which wrecked the Mico College where the teachers were accommodated with board and lodging.

## TRAVELLING INSTRUCTORS.

Sixteen years ago when Governor Sir H. Blake got a vote of £600 for Agricultural Instructors passed in the Legislative Council, it could not be utilised at first because the general opinion was that attempts at instruction of the small settlers would prove futile, and because there was no demand for instruction from the people themselves.

When the demand came two years later in a small way, great care was taken that only thoroughly efficient Instructors were appointed. Mr. Cradwick who had already shown himself to be capable by the instruction he gave at Hope Gardens to Apprentices and Industrial School boys, was first sent on the few occasions any demand was made. Then Mr. R. L. Young of Brown's Town and Mr. J. T. Palache of Manchester took up the work for some years in their own districts with the greatest enthusiasm, giving up almost their whole time to it, though the salary allowed, vix. £100 could only be considered in the light of an honorarium. From these small beginnings great developments have taken place. Under the Board of Agriculture Mr. Cradwick is employed for the whole of his time, and Mr. Briscoe, though Superintendent of the Kingston Public Garden, devotes half of his time to the work of Instruction. Under the Agricultural Society Messrs. Palache, Arnett, and Mennell are employed, and another appointment is contemplated at Messrs. Elder, Dempster & Co. are now contributing a sum of £500 per annum in lieu of their engagement under the Contract to provide six Instructors for the fruit trade.

The work of the Instructors is chiefly amongst the small landholders who own holdings of 2 to 20 acres, of whom there are large numbers in Jamaica.[*] The Instructors go into the peoples' grounds and demonstrate by actual work with their own hands how the soil should be treated; how their coffee, cocoa, &c. should be planted, pruned and cared for; how the crops should be cured and prepared for the market. In illustration of their teaching of methods new to the people, Model Grounds are sometimes worked by settlers in exact accordance with the ideas of the Instructors, drains perhaps being the principal feature and the special improvement suggested, or the application of lime to improve the sour soil, or the demonstration that so-called "worn out" soils are capable of yielding crops.

The diseases of plants also receive attention from Instructors who either point out remedies themselves, or refer the matter to me for advice.

It is considered part of their duty to visit from time to time the School Gardens attached to the elementary schools of their districts, and give advice to the teachers.

*Reclaiming so-called worn-out lands*—The preliminary work in a district is to demonstrate that land which has been given up as worn-out, either owing to coffee having been grown on it for years, or owing to its having been cultivated as a provision field will produce good crops by proper management.

A settler is induced to work out the demonstration for himself, or, failing that, a piece of worn-out land has been bought and worked by the Instructor himself, or by a School Teacher, or by a Committee of a local Branch Society.

The process may be seen in operation in many places: The bush is first cut down, then the ground is hoed and forked, weeds being well covered in, and the whole ground "thatched" with a mulch of long grass or bush. The people have become so convinced of the value of mulching and the folly of burning, that those who have rented lands, bring even the dry corn stalks for miles to their own holdings.

Many have been induced to buy an animal, either young colt or a heifer which gives them manure, and can be turned as well into a source of profit. The animal is fenced on part of the land with perhaps a shed where he may be fed, and shelter from the sun and rain. Fodder is cut and fed to the animal from the land itself or from the roadsides. The bedding, together with the manure, is removed periodically, and applied to the land as it is forked. If the bush and weeds cleared off the land is not sufficient to cover it, the banks on the roodsides are cut, and an enterprising settler will even offer to dig out the worthless fox-tail grass from the fields of some neighbour in order to have it to thatch his ground.

*Planting yams and other provisions*—It was an accepted theory that yams could not be grown on these "worn-out" lands round their houses, and consequently the people rented grounds miles away from their homes, which generally yielded more to the praedial thief than to the tenant. Now, the settler is shown that with proper treatment, the land round his home which he can closely watch, will yield yams. In other districts the people were in the habit of growing bananas only, now they plant yams and other provisions.

*Introducing new and improved varieties of plants :—citrus, peas, sweet potatoes, cassava, vegetables.* The Instructors are doing much good work in introducing improved varieties of plants. They have shown the people how to bud worthless orange stocks with good kinds. and this has especially excited the keenest interest. They have also introduced improved varieties of peas, sweet potatoes, cassava, vegetables, &c.

*Better methods of cultivation*—In many parts of the Island the cutlass and the hoe were the only tools known to the peasantry. The first thing the Instructor would do in starting work in those parts, would be to induce a number of men to club together and purchase a fork. Then would follow demonstrations on the proper method of handling a fork, and on thorough trenching and cultivation of the soil by its means. Each man who helped to buy the fork would take his turn in its use, and the experience of its value would lead to the purchase of a large number of forks in that particular district.

*Proper methods of treatment of plants : pruning coffee and cocoa, suckering bananas, planting citrus*—Very often the land contains some miserable specimens of coffee bushes,—a few whip-like stems, few branches and fewer leaves and berries. These are taken in hand, and gradually changed into bushes well furnished with branches, covered with leaves, and yielding large crops of berries.

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[*] The number of holdings is for St. Catherine, 12,670; St. Mary, 6,585; Portland, 8,536; St. Ann, 11,669; Trelawny, 5,120; St. James, 5,202; Clarendon, 12,291, St. Andrew, 7,532; St. Thomas, 9,749; Westmoreland, 9,872; Hanover, 6,613 St. Elizabeth, 8,733; Manchester, 7,756.

*Better appliances :—barbecues, tanks, coffee pulpers, cane-mills, corn-mills,—resulting in better prices*—It is very striking to see the numbers of tanks and barbecues that have been constructed by the peasantry,—so important not only for properly curing coffee and getting better prices, but still more so for supplying the family with water close to the dwelling house.

*Co-operation*—The provision of such appliances as coffee pulpers, cane-mills, and corn-mills, calling for considerable expenditure has been carried out, under advice and help from the Instructor ; in some cases by combination amongst settlers, each subscribing a portion of the purchase money, and then all taking it in turns to use the machine. It is often said that people in Jamaica will not combine, and cannot co-operate, but the Instructors can point to many instances where co-operation has been quite successful, and it is proved that if the people are only shown how to co-operate, and that it is to their benefit to do so, they can and will combine. This is a moral lesson to them of far-reaching importance.

*Thrift : Agricultural Loan Banks*—Attempts are being made to further extend the idea of co-operation and start Agricultural Loan Banks, providing the money for loans by means of deposits made by the people themselves. If these attempts are successful, the people will be encouraged to form habits of thrift which will be most valuable to themselves and to the community.

Some few banks have been started, and at least two of these are in operation and making loans, the Trinity Ville Bank, and the Christiana Bank. The first annual report of the Christiana Co-operative Peoples' Bank, of which Mr. R. J. Miller is the Chairman, Rev. Dr. Turner the Treasurer, and Mr. W. C. Leslie the Secretary, states that " the bank is steadily growing and is proving a benefit to its members. The bank commenced to make loans to its members in May last and at December 31st, 1906, eight loans had been made, one of which had matured and been repaid and £38 were out on loan. . . .

The income for the year was £28 6s. 5d., and the total funds of the bank £57 18s. 3d. The membership stands at 25.

The President congratulated the members on the very satisfactory character of the report, considering the small number of members and the small amounts paid in. It was considered very satisfactory that the bank has now nearly £60 at its credit and is steadily increasing. . .

The loans made during the year have been for the purchase of stock and land, and for improving cultivations. An application was made for a loan by one not a member of the bank. It was felt, however, that in the meantime at least, the advantages of the bank must be confined to its members. This application was an indication that the benefits of the bank are being recognised by those beyond the circle of its members."

*Prize Holding Scheme*—This scheme has proved to be of the greatest help to the Instructors in enforcing their lessons, and if the money were available it would be well to have it in operation every year in each parish.

It was originally suggested by Messrs. Cradwick and W. Harris from their knowledge of the good results obtaining from the prizes offered for Cottage Gardens in the British Isles.

It is for the encouragement of cultivation on homesteads, and takes the house and sanitary conditions into account in the scale of points proposed.

Only persons holding not more than 20 acres of land are allowed to compete, and the residence must be on the ground entered for competion. Fifteen prizes are offered in each parish and they range in value from £4 to 9s. The judging is conducted on a system of points as follows ;—permanent crops, 30 ; catch crops, 15 ; fences, gates, and general condition of holding 15 ; live stock, 20 ; house, 10 ; sanitary conditions, &c., 10.

The following extracts taken from reports by the Judges in last year's competition in Manchester illustrate the value of the scheme, as aiding the Instructors in their work.

" Eighty-five entries were made in the parish of Manchester and of these 83 were examined. The number of holdings entered in this competion is almost exactly double the number entered in the first competition. . . . There was a general all round, solid improvement in the holdings inspected. Coffee particularly appears to have repaid the Instructor's attention. The pruning is not by any means perfect, generally speaking, but some of the competitors showed us very well handled coffee and there has been a great improvement along these lines ; the competitors are realizing the wisdom of endeavouring to restore their coffee pieces to the order in which they were kept in the days of big prices, and also of endeavouring to increase the yield by manuring, in order to make up the loss in value caused by the low prices prevailing . . .

" More and more use is being made of the stock owned by the peasantry in Manchester for the purpose of making manure for use not only in their coffee pieces, but also for restoring to greater fertility the lands on their homesteads, which were formerly looked upon as useless for the purpose of growing breadfruit, bananas, &c. . . . .

" By growing his provisions on his own land great economy is effected in time—the time occupied to cover the journeys which the peasant formerly took to rent lands goes a very long way toward planting, caring, and cutting the necessary food for the animals to be fed on his own land, then the provisions being planted under his own eye there is very little risk of theft, whereas the remote rent lands are a direct temptation to the lazy man to give up work and prey upon his more industrious neighbour. In only two cases did we have complaints of thefts of crops from the homesteads. By treating the homestead land in such a way that its fertility is increased rather than destroyed, the gradual denudation of the island's forests lands must be checked.

"The example of a well cultivated homestead to the rising generation as compared with the nomadic undisciplined life, incident to the renting system can never be overestimated. The saving of the amounts paid in rents is also considerable and must be put to the credit of the cultivations on the homestead. The amount formerly paid in pasturage for small settlers' animals is gradually being saved. The animals themselves are largely benefiting by this change in the system of their maintenance, for while the animals put before us were not as a rule in very high condition on account of the severe drought which the parish was passing through, only one man showed us an animal on which ticks were visible.

"Increased attention has been paid to the condition of walls and fences; vigilance along these lines cannot, however, by any means be yet relaxed on the part of the instructors. It is most essential that small as well as large properties should be properly fenced and protected by gates; the proper protection of crops from straying animals is of the highest importance and is one of the very good features of the competition.

"The homes of the peasantry of Manchester are, many of them, remarkable for their tidy and well-kept appearance, reflecting great credit on the wives. Even in this and the sanitary conditions there seems to be well marked improvement . . . . . .

Dealing with St. Ann, the Judges say; "We desire to congratulate the Agricultural Society on the wonderful response to their efforts to improve the small holdings as manifested in the preparations and improvements of the holdings submitted for our inspection in the parish of St. Ann. We feel sure that in no other way could such improvement, such interest, such an amount of labour be excited with the expenditure of so little money . . .

"We would particularly wish to place on record the way in which the people take care of their stock especially cattle and the way in which these were utilised for manuring purposes. Lands in these districts which 10 years ago were supposed to be utterly useless, are now by this means producing crops which astonish even the instructors who advocated this method of improving red soils. Then the improvement of houses, sanitary conditions, tanks, &c., as well as in the cultivations, in the hopes of winning a prize in this competition, are little short of marvellous. Houses which possibly might have been built without the competition, but would certainly without it, not have been finished for years, were at once taken in hand and finished; tanks the same . . . .

"We would like to point out to the Society the great help to the work of instruction, and the wonderful facilities afforded by the prize holdings scheme for this purpose; also to urge on the Society to make arrangements so that the judging may not be hurried, in order to afford time for the Instructors to give advice and demonstrations on the thousand and one questions affecting cultivation which are sure to crop up as the judges proceed with their work."

*Teachers' Course*—During the month of January in each year about 80 of the elementary school teachers are brought up to Kingston for an elementary course in the study of the principles and practice of agriculture.

The instructors teach the practical work at Hope Gardens in this Course. This variation in their usual work is of value to them. They are able to meet together and discuss various aspects of their duties, they can obtain information at the Gardens on special points with which they may not be familiar, and they have an opportunity of meeting teachers with whom they have already been in contact.

The following are Reports on their work for the year from the two Instructors under the direction of the Board of Agriculture:—

*Mr. W. Cradwick to the Director, Public Gardens and Plantations.*

Mandeville P.O., April 1st, 1907.

Sir,

I have the honour to submit the following Report on my work as Instructor for the past year.

I beg to state that I have been occupied giving lectures and demonstrations in the Parishes of St. Elizabeth, Westmoreland, Hanover and St. James, assisting in carrying out Agricultural Shows and judging the holdings entered in the Prize Competition in St. Ann, Manchester and Trelawny.

The annual course of Instruction in Agriculture for Teachers was commenced on the 1st of January, a Report was submitted thereon.

Investigation into diseases affecting Coco-nut trees, and remedial experiments have been continued.

Mr. Robert Hay of Green Island has reported that Thrips are affecting his Cocoa, but owing to my removal from the western district, I have been unable to visit the estate.

The lectures and demonstrations have consisted generally on matters connected with Coffee and Cocoa cultivation, and the curing of these crops. Citrus, Vanilla and Pimento have also claimed attention among permanent crops; Bananas, Canes, and the usual food crops, as well as Tobacco have also been dealt with.

The cultivation of the soil and manuring, as affecting all these crops, have claimed a very large share of attention.

Drainage on the heavier lands has been particularly impressed on the peasantry, and considering the absence of any demonstration plot, with fair success.

Coco-nuts have been sprayed at Lucea, Thompson Town, and the Montego Bay Railway Station with a view to the prevention of the dropping of nuts; cracking of nuts and the spread of Bud Rot. The whole of the Coco-nut trees at the Railway Station, Montego Bay, were sprayed. Coco-nut trees were tarred at Orange for the prevention of Borers, the treatment with white lime and arsenic having been found to be ineffectual.

Miss Hedges, one of the Assistants from the Laboratory of the Agricultural Department, Washington, paid a visit to my district and examined Coco-nut trees accompanied by me.

Professor Jno. R. Johnston from the Agricultural Department, Washington, also visited and inspected the Coco-nut trees with me.

The lectures and demonstrations have been fairly well attended, much larger attendances can hardly be expected, especially after the novelty wears off. I do not know that they are altogether desirable except in such instances where the inauguration of a show or some other popular function is taken up in connection with a Branch Society, in such cases the large attendances are desirable, and by holding night meetings, are secured. The demonstrations are only attended by such people as are really interested in them.

The pruning of Cocoa, of Coffee, suckering of Bananas, the fertilization of Vanilla, budding of Citrus, Cocoa, &c., all prove interesting, and judging by the work done by the people themselves, are intelligently observed.

*Shows*—With regard to the Shows held, the smaller Shows seem to be much more useful in encouraging the improvement of all products, except perhaps saddle and harness competition, than the larger Shows; with the exception of such a Show as was held at Montpelier in March 1905. There seems to be an impression among the peasantry that at most ot the big Shows they are not wanted, and when we see a Prize List such as the one issued for the Kendal Show it is perhaps scarcely to be wondered at. Even the Prize List itself is perhaps not so great a deterrent to the peasantry as the want of that active sympathy which can only be demonstrated by personal visits of an officer of the Show or of one acting on his behalf.

With such Shows as these it is interesting to compare the balance sheets as well as the Shows themselves with such Shows as were held by the Hampstead Branch in April, Santa Cruz Branch in November, and the Appleton Branch in December. Whereas the larger Shows usually pay about two-thirds of their disbursements for expenses and one-third for prizes; the smaller Shows have a balance sheet which shows that it is just the other way about, approximately two-thirds of the money going for prizes and one-third for expenses. The Show at Santa Cruz has a record of this kind:—expenses of the Show amounting to £2 14s. 0¾d,, the prize money amounting to £5 12s. 0d.

The Shows being on a smaller scale it is possible to adopt a plan which has been extremely useful and successful, *i, e.,* of allowing all the exhibitors of products to be present while the judging is going on; then explain to them why one exhibit gains a prize and the other does not. When this method of judging is adopted people are willing to be taught, and go away quite satisfied with the result of the competition. Whereas when the judging is done without their being present, the minute differences which cause an exhibitor to gain or lose the prize are not observed by them, and they often go away with the idea that favouritism has been exhibited.

Reports were duly submitted on the results of the Small Holdings Competition in St. Ann, Manchester and Trelawny.

*Coco-nut Diseases*—The Director of Public Gardens has visited the different districts with me and given instructions as to various remedies for different diseases, and the treatment to be applied in each case.

The attempts to get rid of the Bud-rot of Coco-nuts have been to a great extent successful but will never be wholly so unless powers are conferred on the Board of Agriculture by the Legislative Council to deal with trees affected.

At Blue Hole in Hanover where Mr. Taylor has taken steps to burn all trees immediately they have the slightest appearance of being attacked with Bud-Rot, the reduction in the number of deaths from 5 or 6 per cent three years ago, to less than 2 per thousand during 1906 fairly indicates what can be done by prompt measures.

The wisdom of Government interference in such matters is a matter for careful consideration, but it does not appear right to allow one man through neglect to foster a disease wherewith to destroy his neighbour's goods, and the necessity is evident for passing a law dealing with Coco-nut walks wherein the Bud-Rot is present.

After cuttng down all badly affected trees at the Railway Station in Montego Bay the whole of the other trees were sprayed, since this was done at the end of July 1906, the progress of the disease appears to have been entirely checked, and this was one of the worst spots in Jamaica; and where the whole of the trees would have died, had not the measures just mentioned been resorted to.

A Coco-nut tree at Thompson Town in Clarendon, which had never been known to yield good fruit on account of the nuts splitting, was sprayed with Bordeaux mixture; and good water coconuts have since been cut from this tree. This tree was, at the time of spraying, anywhere from 40 to 50 years old. I attributed the dropping to fungoid growth at the base of the nuts, and sprayed with Bordeaux mixture accordingly.

I gave samples of nuts affected in this way from Hanover to Professor Johnston, who said it was undoubtedly a fungoid disease and promised to furnish me with further particulars.

The tarring of the trees at Orange for weevils, is quite successful, after an interval of nearly 12 months only one little appearance of Borer could be discerned, and the improvement in the treated trees is little short of marvellous.

The dropping of leaves and bunches reported by Mr. Taylor at Blue Hole was dealt with, by applying sulphate of iron at the roots of 10 trees, 8 of which received ½lb. sulphate of iron each, 2 receiving 1lb. sulphate of iron each. From none of the trees treated had Mr. Taylor picked a ripe nut. On the occasion of the visit of myself and Professor Johnston on March 18th all the treated trees were holding nuts, and those which had received the larger dose had ceased to drop entirely. Professor J. R. Johnston said that the coco-nut trees at Blue Hole were the finest that he had ever seen. Mr. Taylor showed us trees not yet 7 years of age, which had on over 200 nuts each.

*School Gardens.*—School Gardens have been visited whenever possible and considerable progress and improvement has been noted in some cases.

I have the honour to be, Sir,
Your obedient servant,
W. CRADWICK.

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*Mr. J. Briscoe to the Director of Public Gardens and Plantations.*

Parade Gardens,
March 31st, 1907.

Sir,

I have the honor to submit to you my report on my work as Travelling Instructor for the Parishes of St. Andrew and St. Thomas-ye-East for the year ending March 31st 1907.

When I first took up this work, I found most of the Branches in these two districts in a lifeless condition. However I visited them as often as possible, giving lectures on general agriculture, and practical demonstrations in the fields of the small settlers, and have succeeded in arousing new life and energy. The practical demonstrations are especially appreciated and are productive of much good.

With the assistance of Mr. Barclay two new Branches were formed and affiliated in St. Andrew, and two defunct Branches have been revived and amalgamated. One of the new Branches held a Show at "Maverly" in St. Andrew.

I assisted in judging at Maverly and Kendal Shows, and helped to organise the Show proposed to be held on Serge Island Estate, but this had to be postponed.

I have visited, lectured and demonstrated at the following Branch Societies:—Red Hills Central St. Andrew, Sargentville, Lawrence Tavern, Cambridge, Æolus Valley, Above Rocks Manning's Hill, St. Christopher's (now named Central St. Andrew) and Mt. James.

I have given constant attention in those districts to the cultivation of cocoa, coffee, bananas and citrus fruits, and am glad to note a steadily marked improvement, more especially in the cultivation of cocoa, as a result.

The experiment carried out by the Rev. Cole at Yallahs for the coco-nut disease, of applying a mixture of 3 quarts of coarse salt and a piece of common soap, to the cabbage in the top of the palm has proved very successful on the five trees experimented upon, and they are now in a very healthy condition.

In some of my districts there seems to be a good deal of disappointment amongst the small settlers as to the way in which the "Small Holdings Prize Competion" scheme was worked out during recent years.

The drought in the Parishes of St. Andrew and St. Thomas has been very severe for the past four months. The stock in some parts have suffered greatly, many having died of starvation.

I have given the following number of demonstrations in the parishes or St. Andrew, St. Thomas and St. Catherine.*

* * * * * * * *

I have also pruned several grape vines in St Andrew and Kingston.

I have already sent in ten detailed reports of my visits to the above mentioned places.

I have the honour to be, Sir,
Your obedient servant
J. BRISCOE.

Periodical Reports by the other Instructors are made to the Board of Management of the Agricultural Society.

## BULLETINS.

The numbers of copies of the Bulletin distributed every month is 2,108, of which 397 are sent abroad. Besides this regular number, many copies are constantly being sent which contain special articles on special subjects about which information is sought.

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*List appears in Appendix I., page 26.

In the volume for 1906, commencing with April, the following articles appear:—

- Cassava Trials: III. By H. H. Cousins.
- Cotton Disease. By F. A. Stockdale.
- Logwood: Disease and Cultivation. By Prof. Earle, Dr. Bucher and J. W. Edwards.
- Early Oranges. By W. Fawcett and Dr. H. G. Tillman.
- Forwarding Diseased Plants and Insect Pests.
- The Coco de Mer, or Double Coco-nut. By G. V. Nash and S. Ward.
- Notes on the "Castilloa" Rubber Tree
- Coagulation of Castilloa Rubber. By S. W. Sinclair.
- Grass Oils. By Herbert Wright and others.
- Agriculture of Porto Rico.
- Nature and commercial uses of Ben Oil.
- Snails and Slugs.
- Insect Pests. By Dr. L. O. Howard.
- New Species of Fern of Genus Polypodium from Jamaica. By Wm. R . Maxon, U.S Dept. of Agriculture.
- Note on Silk Worms from Colombia. By M. Grabham, M.A., M.B.
- Report on the tanning materials and manufacture of Leather in Jamaica. By M. Nierenstein, Ph. D.
- Statistics of Tanning materials and leather for Jamaica.
- Brazilian Coffee Legislation.
- Sea Island Cotton Seed for 1896.
- Camphor in Ceylon, By M. Kelway Bamber & J. C. Willis.
- Paris Green: Application to Cotton. By W. B. Seabrook.
- A Mexican Rubber Plantation.
- Black Leg. By W. H. Dalrymple.
- New method of keeping Fruit by the use of Formalin.
- Coco-nut Bud Rot Disease.
- How to keep Mosquitos from the House.
- Exporting Seed of Para Rubber. By H. N. Ridley.
- Acreage in Rubber.
- Planting of hard and soft wooded plants. By W. J. Thompson.
- Turmeric.
- Jamaican Ginger.
- Study of Castilloa Rubber.
- Para Rubber. Review by W. G. Freeman.
- Lagos Silk Rubber.
- Planting seed Coco-nuts: II.
- Brazilian Coffee.
- Tobacco Dust as a Fertilizer and Insecticide. By G. L. Lucas.
- The Lleren: a rear root crop. By O. W. Barrett.
- Tanier, the oldest crop. By O. W. Barrett.
- Ring-barking. By A. Tatham.
- Forests and Rivers.
- Renovation of worn-out Soils. By W. J. Spillman.
- Tobacco from Jamaica– VII.
- A new Botrychium from Jamaica. By Wm. R. Maxon.
- The Mangosteen.
- Corn Production and Consumption.
- Agriculture in Bermuda.
- Vanilla Statistics.
- The Culture of the Date Palm.
- Notes on the Cultivation of Vegetables. By Wm. Harris.
- Camphor Cultivation.
- Rubber in the Federated States.
- Kapok.
- Coffee Cultivation in Brazil.
- The Cultivation of Cacao in Ceylon. By Herbert Wright.
- General Instructions to Teachers on School Gardens. By. W. Cradwick.
- Notes on Rubber-producing Plants. Complied by Wm. Harris.
- Ramie, Rhea, China Grass (Boehmeria nivea)

In the volume for 1907, January, February and March, the following articles appear:—

- Grape Vine Culture. Compiled by Wm. Harris.
- West Indian Agricultural Conference.
- Rubber. By Prof. Dunstan, and H. N. Ridley.
- Pine Apple prowing in Jamaica. By G. L. Lucas.
- Cotton in 1786 and 1799.
- Work at Tropical Station, Cinchona. By Dr. F. Shreve.
- Diseases of Palms. By E. J. Butler.

In both volumes are extracts from the proceedings of the Board of Agriculture.

## STUDENTS IN THE GARDENS.

We had the pleasure of seeing the following who spent some time in the gardens and herbarium, either studying our work in the gardens and station, or the collection of plants in the herbarium :—

Dr. Fred. Börgesen, Botanical Museum, Copenhagen.
Mr. Ralph T. Hinckes, Foxley, Hereford, England.
His Honour F. H. Watkins, Commissioner, Turk's Island.
Miss Florence Hedges, Washington, D.C., U.S.A.
Dr. & Mrs. N. L. Britton, New York Botanical Garden, U.S.A.
Miss Marble, New York.
Dr. L. M. Underwood, Columbia University, New York, U.S.A.
Dr. M. A. Howe, New York Botanical Garden, U.S.A.
Sir D. Morris, Commissioner Imperial Dept. of Agriculture, Barbados.
Mr. H. A. Ballou, Mr. F. A. Stockdale, and other members of the staff of the Imperial Department.
Dr. Wm. Trelease. St. Louis, Mo., U.S.A.
Lord Frederic Hamilton, London, England.
Lord John Hamilton " "
Mr. M. H. Siegel, U.S.A.
Prof. G. S. Boulger, Richmond Hill, England.
Mr. Wm. Bellows, Gloucester, England.
Mr. Jesse Collings, M.P., England.
Viscount Mountmorres, Director, Institute of Tropical Research, Liverpool, England.

## HOPE INDUSTRIAL SCHOOL.

The average number of boys in residence was 50.

The school was examined on 1st May, 1906, by Mr. G. H. Deerr, and the concluding paragraph of his report states :—

"Though only appointed for six months, the new Master-in-charge, Mr. L. Z. Brandford is to be congratulated on the marked improvement effected. Considering the shortness of the time and the lamentable state of ignorance on his arrival, the progress made by the boys, especially in Drawing, Scripture and Agricultural information is creditable."

Mr. Brandford has visited the other Industrial Schools within reach and also the Reformatory, and gained useful information.

He has taken a keen interest in the School Garden of the Institution, and saved a sum of £4 19s. 10d., by its produce.

The boys' own gardens have been encouraged. Mr. Brandford reports that "over 17s. worth of potatoes and pumpkins has been bought by the school, besides peas, cabbages, &c., sold otherwise . . .

. . . "The School gardens have been the scene of very interesting operations during the year, putting into practice the instructions received at the Hope Gardens and in school. The boys displayed a very cheerful spirit throughout, and seemed to have enjoyed with special relish the products of their own labour used for their diet."

The expenditure was as follows compared with the previous year :—

Average number of Boys for 1906-07 = *50*, for 1905-06 = *48*.

| | 1906–7. | Cost per head per diem. in Pence. | 1905–6. | Cost per head per diem. in Pence. |
|---|---|---|---|---|
| | £ s. d | d. | £ s. d. | d. |
| Personal Emoluments .. | 250 8 0 | 3.29 | 263 4 5 | 3.60 |
| Diet ... | 251 8 1 | 3.30 | 236 6 3 | 3.23 |
| Clothing ... | 56 0 5 | .74 | 58 14 0 | .75 |
| Bedding ... | 10 8 2 | .13 | 11 1 6 | .15 |
| Medicines and Hospital Extras ... | 12 3 6 | .16 | 6 7 10 | .08 |
| Lighting and Fuel ... | 12 6 3 | .17 | 11 18 3 | .16 |
| Water ... | 13 6 6 | .18 | 16 18 2 | .23 |
| Implements of labour ... | 8 6 7 | .11 | 3 2 8 | .04 |
| Rewards ... | 6 11 11 | .08 | 6 8 2 | .08 |
| Books for School ... | 5 9 6 | .07 | 4 19 11 | .06 |
| Corn for Stock ... | 3 0 9 | .04 | 3 19 9 | .05 |
| Officers' Uniforms ... | 6 2 1 | .09 | 10 17 8 | .14 |
| Furniture ... | 4 19 11 | .06 | 5 0 6 | .06 |
| Miscellaneous ... | 22 4 1 | .29 | 20 16 10 | .28 |
| | £662 15 9 | 8.71 | £659 15 11 | 8.91 |

The above expenditure includes £3 15s., paid by transfer draft to Hope Gardens for 1,800 lbs. of Sweet Potatoes supplied from the Experiment Station.

The expenditure is less by £4 19s. 10d., on account of the following contributed from the School Garden of the Institution :—

| | | | | |
|---|---|---|---|---|
| 86lbs 2oz. red peas at 28s. contract rate | ... | £1 | 4 | 0 |
| 594 " 12 " pumpkids at 5s. " " | ... | 1 | 9 | 9 |
| 971 " 0 " Sweet potatoes at 4s. contract rate | ... | 2 | 6 | 1 |
| | | £4 | 19 | 10 |

## III.—FINANCIAL.

### EXPENDITURE.

The expenditure on the Hope Gardens, Nursery, and Experiment Station was as follows :—

(1) *Garden.* (26 acres)

| | | 1906–7. | | |
|---|---|---|---|---|
| Maintenance | ... | £376 | 12 | 0 |
| Carts, harness, tools, sheds, fences, water pipes, &c. (½ cost) | | 74 | 6 | 3 |
| Water (⅓ cost) | ... | 43 | 17 | 0 |
| Total | ... | £494 | 15 | 3 |

As the pastures have to be kept in order also out of the expenditure, it is therefore at the rate of less than £18 per acre per annum, which is an extremely moderate allowance for garden work.

(2) *Distribution of Plants.*

The expenditure on nursery work and transport expenses was as follows :—

| | | | | |
|---|---|---|---|---|
| Nursery work | ... | £376 | 12 | 9 |
| Transport of plants; labour in packing and despatching plants; supplying cases; drayage; bamboo pots; moss; bills of lading, &c. | ... | 394 | 9 | 0 |
| Carts, harness, tools, (½ cost) | ... | 74 | 6 | 4 |
| Water (⅓ cost) | ... | 43 | 17 | 0 |
| Total | .. | £889 | 5 | 1 |

(3) *Experiment Station.*

The expenditure on the Hope Experiment Station was as follows :—

| | | | | |
|---|---|---|---|---|
| Labour, establishing and maintaining area under cultivation | | £341 | 15 | 5 |
| Pupil apprentices | ... | 56 | 2 | 0 |
| Tools, sheds, equipment | ... | 50 | 14 | 6 |
| Repairs to Tobacco House | ... | 7 | 8 | 6 |
| Foreman | ... | 43 | 3 | 11 |
| Purchase of cane tops | ... | 1 | 0 | 0 |
| Cook for labourers | ... | 13 | 0 | 0 |
| Water (⅓ cost) | ... | 43 | 17 | 0 |
| Total | ... | £557 | 1 | 4 |

### RECEIPTS.

The receipts were —

| | | | | |
|---|---|---|---|---|
| Plants | ... | £350 | 12 | 6 |
| Bulletins | ... | 6 | 6 | 4 |
| Total | ... | £356 | 18 | 10 |

## IV.

## DISTRIBUTION OF PLANTS.

The number of plants distributed was 189,266. We have purchased such seeds as were necessary, propagated plants, keeping them for some months with careful handling in the nursery, supplied pots, packed them, carted them to the wharf or Railway Station, and sent them to ports or stations all over the Island at a cost of a fraction over a 1d. a plant.

I have much pleasure in acknowledging the very ready and most valuable assistance rendered to me in the distribution of plants, and receipt of seeds, woods and other specimens by the Director of the Railway, the Traffic Superintendent, the Station Masters, and the Officers of the Local Coastal Steamers.

I have also to acknowledge the great assistance afforded to the Island by the co-operation of the Royal Mail Company with the Imperial Department of Agriculture and with this department in sending plants free of all charges between the West Indies inter-colonially, and with the mother country.

Messrs. Elder, Dempster & Co. have always been most generous in sending cattle, &c., as noticed in the reports of the Agricultural Society.

## V.

## LIBRARY.

The additions to the Library are catalogued in Appendix.*

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* Not printed.

## VI.

## HERBARIUM.

Prof. Urban, Under-Director of the R. Botanic Gardens and Museum of Berlin, and Dr. Britton, Director-in-chief of the New York Botanical Gardens, with co-adjutors, contiuue work on the flora of the West Indies. Several new plants have been discovered in Jamaica and distributed by the Department. About 729 sheets have been laid into the Herbarium.

The stand with folding leaves containing specimens of Economic Plants, has had constant attention—fresh specimens being added to replace old plants, and new plants being inserted.

The use of the stand enables students to observe characters of the plants at a glance without any risk to the specimens by handling.

A full list of the specimens is given in the Appendix.*

Wood specimens are increasing in number. The greater number including all the large specimens are placed in a room in the old great house. There is a collection of hand specimens in the herbarium. A list is given in the Appendix.*

## VII.

## GARDEN WORK.

### HOPE GARDENS.

Mr. William Harris, F.L.S., J.P., is Superintendent of Hope, Castleton and Cinchona Gardens, and the following paragraphs are from his Report:

*Carriage Drives*—All the main drives through the Gardens were re-shaped and put in thoroughly good order during the year. The material at our disposal for this purpose is simply gravelly soil, and as there is considerable wash during heavy rains, and a good deal of traffic over the drives, constant attention is necessary to keep them in good order.

*Lawns*—The lawns have been regularly mown, weeded, watered by sprinklers in dry weather, and kept in good order.

*Ornamental Borders*—These have been weeded, forked, manured and watered as needed. The new border formed in 1903-4, north of the Water Works conduit and planted with masses of single and double Poinsettia, Crotons, Hibiscus, Jasmines, &c. has made excellent progress and is now an important feature of the Gardens. From December to March the Poinsettias make a brilliant display of colour.

*Rosary*—Many of the old worn-out bushes have been dug up and replaced by young plants. Our soil is not altogether suitable for roses being too light and sandy, nevertheless we get a really fine display of blooms during the summer and autumn months, the quantity of blooms compensating for lack of substance in individual flowers. The plants soon become old and exhausted; at three or four years old they are worn-out bushes and must be replaced by younger stock.

*Pergolas*—The pergolas erected in 1903 for the display of various tropical climbers are most satisfactory. They are a total length of 180 yards by 12 feet wide and 8 feet high. The climbers trained over them are Passiflora macrocarpa, Thunbergia laurifolia, Thunbergia grandiflora alba, Jasminum officinale, Bougainvillaea spectabilis var, lateritia, Plumbago capensis, Petrea volubilis, Porana paniculata, Solanum Seaforthianum, Solanum Wendlandii, Clitoria Ternatea, fl. pl., Beaumontia grandiflora, Stephanotis floribunda, Bignonia venusta, Allamanda Hendersoni, &c.

*Water Garden*—This is always an attractive feature in the Grounds. The pools of clear running water with Nymphaeas and gold fish, and the back ground of Heliconia Bihai, Arundo Donax, tree ferns, and fragrant Hedychiums, &c.,—all tend to make it attractive and interesting. Some improvements in the arrangement are contemplated and will be carried out in the near future.

*Rockery for Native Orchids, &c.*—Whilst some of the more showy native orchids do well on trees under shade there are others that perfer the open, or only partial shade. For these a rockery has been partly constructed and will be completed as soon as possible. It is being formed with the stumps of the teak trees which was cut down in 1903, and with large stones, lime rubbish, soil and peat. The upper portions of the teak stumps are turned downwards with the stout pronged roots standing up well above the foundation of the rockery, and on these the epiphytic orchids are being planted, whilst terrestrial species and other suitable plants are being used for the spaces between the stumps and large stones.

*Succulent Slope*—In last Annual Report mention was made that a rather unsightly bank 160 yards in length along the new entrance to the Nursery had been sloped and partly planted with cacti and other succulents, &c. The planting of this slope was completed during the year, but some further improvements in the background have suggested themselves and will receive attention at an early date.

The following species are now growing on the slope, in nearly every case a large clump, or several clumps of each:—Agave asperrima, A. decipiens, A. filifera, A. Franzosini, A. Lechuguilla, A. marmorata, A. rigida var. sisalana, A. Wightii, A. Wightii variegata, Furcraea gigantea var. Willemetiana, Cereus validus, C. Swartzii, C. lepidotus, C. repandus, C. triangularis, C. grandiflorus, Opuntia ficus-indica, O. spinosissima, O. Dillenii, O. megacantha, O. sp. (Jamaican)

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* Not printed.

Melocactus communis, Pilocereus Rozeni, Nopalea coccinellifera, Phyllocactus Hookeri, Aloe vera, A. saponaria, Yucca aloifolia, Pedilanthus angustifolius, Euphorbia lactea, E. troyana, Phyllanthus speciosus, Sanseviera guineensis, S. zeylanica, S. cylindrica, S. ehrenbergii, Jatropha podagrica, Catesbaea spinosa, Bromelia superba, Vinca rosea, var. alba, Tribulus cistoides, &c.

*New entrance to Nursery*—In 1901-2 a new road 22 chains in length was made from the Nursery in a direct line through the bush to the public road. This was intended for the use of carts and drays transporting plants from the Nursery to the Railway and to the wharves, &c. and for other heavy traffic, to save the main carriage drive through the Gardens. As this new road leads directly to the centre of the Gardens it is used by nearly all the visitors who come up by electric tram car. It was necessary, therefore, to make it more than a mere cart road and improvements are being made each year as funds for the purpose can be spared. At first the road itself was thoroughly reconstructed and shaped, a deep cutting being excavated for about a third of the total length, the stones and gravelly soil taken from this being utilized to fill up a depression for about another third. Then two neat shelter sheds with benches for the use of visitors were erected at the entrance near the electric car line. The unsightly bank mentioned in previous paragraph was next taken in hand and converted into an interesting succulent slope. Last year a substantial fence was erected along a third of the west side of the road to keep out the small stock from a neighbouring settlement; the planting of the slope was completed, on the east side of the road a space of 180 yards by 5 yards was cleared and thickly planted with bulbs of Hippeastrum equestre, var. major, which made a brilliant show of colour from end of December to middle of March, whilst the west side, a portion of about 10 chains by 2 chains, or 2 acres, was cleared, stumped, ploughed and harrowed and planted with Colombian varieties of cassava which will help to keep the ground clean and afford protection to ornamental trees which will be put out during the coming year until such time as they can get along without shelter and protection.

Various plans to still further improve this favourite entrance are under consideration.

*New Clearing.*—A portion of the land south of the Water Works conduit and running from the new entrance described in previous paragraph due west to the main entrance, a distance of about 16 chains, and a width of nearly 2 chains, or a total area of 3 acres was thoroughly cleared of trees and bush, stumped, ploughed and prepared for tobacco.

It is intended to plant this belt of land with ornamental flowering trees such as Triplaris surinamensis, Poinciana regia, Spathodea campanulata, Erythrinas, &c., arranged in such a way that the colours will harmonise, and produce a fitting background to the southern portion of the ornamental garden.

Bael Fruit (*Ægle Marmelos*). A tree of the Bael at Hope Gardens bears fairly heavy crops of fruit every year. This tree appears to be cultivated all over India for the sake of its fruit. The unripe fruit acts as an astringent and is used in cases of dysentery; the ripe fruit taken in the fresh state, is laxative, but the dried ripe pulp is only mildly astringent.

Elephant-Apple (*Feronia elephantum*). This is also an Indian tree, not yet fruiting at Hope Gardens, but in the neighbourhood it produces fruit in abundance.

Sir George Watt states that the ripe fruit is made into a sort of *chátni* with oil, spices and salt, and is esteemed by the natives.

The fruit itself is an aromatic antiscorbutic, and in the form of a sherbet is sometimes given to children, alone or in combination with *bael* fruit, as a stomachic stimulant. The Hindus regard the unripe fruit as a useful astringent in diarrhœa and dysentery.

These two trees, the *bael* and the *elephant-apple,* were formerly in the collection at Castleton Gardens, but they never prospered there and finally died, thus proving that a dry climate like that of the Liguanea Plain is better suited to their requirements than a damp climate like that of Castleton.

*Bougainvillaea*—The fine plants of the brick-red Bourgainvillaea (B. spectabilis, var. lateritia) make a splendid show of bloom from early in December to about the middle of March. An iron arch has been erected over the road leading from the Gardens proper to the Experiment Station, and over this portions of two plants of the Bougainvillaea are trained.

*Orchids*—The collection of exotic orchids is in good condition and the following species and varieties flowered during the year:—Aerides odorata; Angraecum eburneum virens, A. sesquipedale; Arpophyllum spicatum; Aspasia epidendroides; Bletia Shepherdii; Brassavola cordata, B. nodosa, B. Sloanei; Brassia caudata, B. maculata; Broughtonia lilacina, B. sanguinea; Bulbophyllum Careyanum; Calanthe Veitchii; Catasetum macrocarpum, C. Oerstedii; Cattleya Bowringiana, C. Dowiana aurea, C. Gaskelliana. C. Mossiae, C. Trianaei, C. Warscewiczii, C. Skinneri, C. superba; Coelogyne flaccida, C. Dayana, C. Massangeana; Cymbidium pendulum, C. giganteum; Cynoches chlorochilon, C. ventricosum; Dendrobium albo-sanguinea, D. aggregatum, D. bigibbum. D. Cassiope, D. chrysanthum, D. densiflorum, D. Draconis. D. endocharis, D. Farmerii, D. fimbriatum var. oculatum, D. moschatum, D. Parishii, D. Pierardi, D. pulchellum, D. tortile, D. undulatum; Dendrophylax Fawcettii, D. funalis; Diacrum bicornutum; Epidendrum alatum, E. anceps, E. ciliare, E. cochleatum. E. discoidale, E. fragrans, E. nutans, E. Standfordianum, E. subaquilum, E. rivulare, E. spondiadum; Gongora atropurpurea, G. quinquenervis; Ionopsis utricularioides; Isochilus linearis; Laelia anceps, L. Digbyana, L. flava, L. glauca, L.

tenebrosa; Lycaste Barringtonieae, L. macrophylla, L. plana; Maxillaria crassifolia, M. tenuifolia; Oncidium Cebolleta, O. incurvum, O. luridum, O. ornithorrynchum, O. Papilio, O. quadripetalum, O. sphacelatum; Phaius grandifolius; Phalaenopsis amabilis, P. Sanderiana, P. Schilleriana; Rhynchostylis retusa var. praemorsa; Schomburgkia Lyonsii, S. Thomsoniana, var. albo-purpurea, S. Tibicinis; Sobralia violacea; Stanhopea eburnea, S. tricornuta, S. oculata; Trigonidium Egertonianum; Vanda Batemanii, V. coerulescens, V. tricolor, V. t. var. suavis; Vanilla planifolia, V. Pompona; Xylobium discolor.

*Labelling Trees, &c.*—The labelling of trees, &c., in the permanent collections received attention during the year and over 100 specimens were labelled. The labels, which were prepared in Kingston, are of mahogany, painted white with the lettering in black.

*Nursery*—The important work in the nurseries demands and receives at all times careful attention.

During the year 193,538 seeds of Para rubber in two consignments were received from Singapore. In October, 1906 we received 15,307 seeds packed with incinerator earth in biscuit tins. Of this number 2,071 germinated in transit and of these 300 survived. Of the seeds received by us, (13,236) deducting the 2,071 which germinated *en route*, we successfully raised 62.8 per cent.

The second consignment of 178,231 seeds arrived in December. Of these seeds only 170 germinated in transit, 224 seeds were rotten, and we distributed 33,810 as received, except 2,700 which were selected from the seed beds. This left us with 144,027 seeds for planting, and of these we successfully raised only 8.5 per cent. These seeds were evidently old and should not have been forwarded.

*Meteorology*—We had very seasonable weather up to end of November when a drought set in, and since the beginning of December we have only had 2.21 ins. of rain, distributed as follows:—December, 0.04 ins. distributed over 2 days; January, 1907, 0.14, distributed over 4 days; February, 1.77 ins. distributed over 9 days; March, 0.26 ins. distributed over 2 days.

The elevation of the Barometer at the Gardens is 668 feet above sea-level. The mean annual temperature is 77.1 F., and the average annual rainfall 54.21 inches for 26 years.

The amount of rain that fell during the year was 63·58 inches. The wettest months were April, May, June, September, October, and the driest were July, December, January, February and March.

The mean temperature for the year was 78.2 F.

The meteorological tables for the different months are given in Appendix III. page 28.

## PLANTS DISTRIBUTED.

### *Sold.*

| | |
|---|---|
| Economic Plants :— | |
| Cocoa | 32,035 |
| Rubber | 23,226 |
| Nutmegs | 711 |
| Citrus | 1,474 |
| Pine-apples | 361 |
| Camphor | 1,132 |
| Ippi-appa | 4,825 |
| Ramie | 10,500 |
| Tobacco | 19,500 |
| Miscellaneous fruit and economic plants | 3,187 |
| | 96,951 |
| Ornamental Plants | 12,207 |

### *Free Grants.*

| | |
|---|---|
| Eucalyptus and Melaleuca | 916 |
| Cane tops and cuttings | 45,965 |
| Miscellaneous, including timber and shade trees | 33,227 |
| | 80,108 |

| | |
|---|---|
| Total number of economic plants | 177,059 |
| do. ornamental plants | 12,207 |
| do. plants distributed | 189,266 |

### GARDEN CORRESPONDENCE (Superintendent's office.)

| | |
|---|---|
| Letters received | 1,741 |
| do. despatched | 3,064 |

not including numerous memoranda.

## CASTLETON GARDENS.

*Palms*—The specimens in the Palmetum are, with few exceptions, in excellent condition. The trees are regularly cultivated with good results as is shown by their healthy appearance.

*Ornamental Beds and Borders*—These are regularly weeded and cleaned and frequently forked over and are always in a good state of cultivation. The plants get a general pruning once a year and some vigorous-growing kinds more often if needed. Except immediately after pruning the flowering shrubs are in bloom during the greater part of the year, and there are at all times sufficient to make the garden bright and interesting.

*Lawns and slopes*—The grass slopes and lawns were regularly billed and the grass kept low and in good order. A small lawn mower was sent over for trial but owing to the uneven and rather spongy nature of the ground it could not be worked satisfactorily.

*Walks*—The walks are always much cut up during heavy rains, and the work of replacing and renewing gravel entails considerable expenditure in the course of the year.

*Rubber Plants*—The plants of Para rubber put out in December 1905 and March 1906 are in excellent condition and have made satisfactory growth, several being now over seven feet in height.

*Propagation of plants*—About 20,000 plants were propagated at Castleton during the year and of these 11,046 were removed to Hope nursery by the Hope carts and van. The cost of propagating, bamboo pots, and transport of plants is charged against Hope Gardens whence the plants are distributed.

*Trees, &c., in flower or fruit*—The following trees, &c., of interest flowered, and in many cases fruited during the year:—

Amherstia nobilis, Burma
Arenga Wightii, Malabar
Artocarpus Lakoocha, India, Burma, Ceylon
Baphia, nitida, W. Africa
Berria Ammonilla, India, Burma, Ceylon
Bombax malabaricum, *Simal tree*, India, Java
Brownea coccinea, Venezuela
Cassia nodosa, India and Burma
Cerbera fruticosa, Burma
Cocos australis, Brazil
Cocos botryphora, Brazil
Cocos flexuosa, Brazil
Colvillea racemosa, Madagascar
Copernicia cerifera, *Wax Palm*, Brazil
Couroupita guianensis, *Cannon ball tree,* Trop. America
Davidsonia pruriens, Australia
Dillenia indica, East Indies
Diospyros discolor, *Ebony*, Phillippine Islands
Dracaena concinna, Madagascar
Faradaya splendida, Queensland
Garcinia indica, *Kokam butter tree,* India
G. Morella, *Gamboge tree*, Malay Archipelago
Heliconia Bihai, *Wild Plantain*, W. Indies, &c.
H. psittacorum, West Indies, &c,
Hevea confusa, B. Guiana
Heritiera macrophylla, *Looking-glass tree,* India
Kigelia pinnata, *Cucumber tree,* Trop. Africa
Lagerstroemia Flos-reginae, *Queen's Flower,* India & Burma
Lecythis Zabucajo, *Sapucaia Nut*, Brazil
Licuala grandis, New Britain
Livistona australis, Australia
Manihot Glaziovii, *Ceara Rubber.* Brazil
Mesua ferrea, *Naghas tree*, India and Ceylon
Michelia Champaca, *Champac tree*, India
Mimusops Elengi, India and Malay Peninsula
Monstera deliciosa, Mexico
Myroxylon toluiferum, *Balsam of Tolu,* Trop. America
Napoleona imperialis, Trop. Africa
Norantea Guianensis, Guiana & Brazil
Oncoba spinosa, Arabia
Pandanus utilis, *Screw Pine,* Madagascar
Parkia Roxburghii, India and Malaya
Pimenta acris, *Wild Clove,* W. Indies and Venezuela
Posoqueria longiflora, Guiana
Pterocarpus Draco, *Dragon's Blood tree*, W. Indies
Ravenala madagascariensis, *Traveller's tree,* Madagascar
Rhodoleia Championii, Hong Kong
Renanthera coccinea, Cochin China
Samadera indica, *Neipa Bark tree,* India, and Ceylon
Saraca indica, *Asoka,* Ceylon and Malaya
Semecarpus Anacardium, *Marking-nut tree,* India
Smilax papyracea, *Sarsaparilla,* Tropical America
Tabernaemontana longiflora, Trop. Africa
Tectona grandis, *Teak tree,* India and Burma
Victoria regia, Guiana
Wagatea spicata, East Indies
Wormia Burbidgei, North Burma

*Mangosteen*—Although the soil round the Mangosteen trees was thoroughly forked and manured the trees did not fruit during the year.

*Meteorology*—The elevation of the garden is 496 feet above sea-level. The mean annual temperaturature is 75.8 F. and the average annual rainfall 115.92 inches for 35 years.

The amount of rain that fell during the year was 128.08 inches. The wettest months were May, September, October, January, and the driest were July, December, February, March.

The mean temperature for the year was 76.1 F.

The meteorological tables for the different months are given in Appendix III. page 28.

The visitors to the garden for the year numbered 2,102. This number would, no doubt have been very much larger, but the disastrous earthquake on the 14th January brought to an abrupt close the tourist season which usually lasts to the end of March.

## HILL GARDENS.

*Cinchona*—This garden, as usual, was kept in good order during the year.

Heavy rains in September and November did considerable damage to the walks on the slopes by washing off the sand, but this has been replaced where most needed.

The rose beds were deeply forked and several hundred barrels of fresh soil added to raise them to their former level.

Roses do remarkably well at this garden and during the summer and autumn months the bushes produce blooms in the greatest profusion.

The borders of miscellaneous shrubs, herbaceous plants, lilies, &c., were also forked and at all times kept in good order, and bright with flowering plants of Heliotrope, Salvias, Richaradia Africana, R. Elliottiana, Fuchsias, Azaleas, Abutilons, Geraniums, Agapanthus umbellatus, A. umbellatus albus, Crinums, Amarylilis, Tigridia, Antholyza, Sparaxis, Callistemons, Datura suaveolens, Magnolia fuscata, &c.

Twelve dozen roots of *Alsophila pruinata* were planted out in the Arboretum below the garden and are growing luxuriantly.

The orris root plants (*Iris germanica* and *I. florentina*) planted along the edges of the walks in the old nursery, a total length of over 300 yards, having spread too much and got out of line were lifted and the lines were replanted.

*Roads and Fences*—The road from St. Helen's Gap to Monkey Hill, 240 chains, or 3 miles in length, was twice billed and cleaned during the year.

It is necessary that this road should be kept open so that the property may be inspected occasionally to prevent squatting.

Six hundred and fifty plants of Pitch Pine (*Pinus palustris*) were put out along this road above St. Helen's Gap and are doing well.

The fences and gates near the homestead were overhauled and put in good order.

The road to Clyde stream was kept open, and the main pathways through the plantations near the homestead were kept clean and in good order.

*Pastures*—The paddocks have been kept clean but the large pastures are quite overgrown with bush.

*Buildings*—The residences were much damaged by the earthquake on the 14th January. The massive stone chimney was thrown down and in falling caused serious injury to the roof and ceiling of the main building.

The kitchen chimney was also demolished and carried with it the whole end of that building. The stone nogging and plastering in both dwellings were so much cracked and damaged that both will have to be replaced to a large extent.

The buildings and tanks are being repaired by the Public Works Department.

*Resource*—There are still a few fruit trees alive in the old garden.

*Meteorology*—The elevation of the Hill Garden, where the instruments are kept, is 4,907 feet above sea-level. The mean annual temperature is 62·4 F. and the average annual rainfall 103·84 inches for 36 years.

The amount of rain that fell during the year was 118·52 inches. The wettest months are April, May, June, August, September, October and November, and the driest were June, January March.

The mean temperature for the year was 61.8 Fah.

The meteorological tables for the different months are given in Appendix III. page 29.

## KINGSTON PUBLIC GARDENS.

Mr. J. Briscoe is the Superintendent of the Kingston Public Garden, and the following paragraphs are from his Report:—

I have the honour to report to you that I took charge of the Parade Garden in Aprtl 1906, and since that time have superintended the work required to keep the garden in order, besides my duties as Agricultural Instructor.

There were a number of unsightly tree roots in the enclosures; thirty-seven of these have been removed and the enclosures billed and cleaned.

A number of ornamental flowering and foliage plants have been put out in the borders.

Six new beds have also been made and planted with yonng rose trees procured from Hope Gardens.

These would have done much to beautify the garden if allowed to remain, as the few remaining plants have done well, but I am sorry to report that it is almost useless to plant any choice plants in the garden, as they are stolen almost as soon as planted; I have lost over thirty rose plants in this way during the year.

One large bed was also made at the back of the Court House and planted with double Poinsettias. These have done well and were greatly admired.

The fountain was thorougly cleaned. This was rather a big job and necessitated the employment of three extra men. The water lilies were replanted in fresh soil, and have since flowered well.

One of the chief items of labour is keeping the walks clean, as the public throws so much rubbish about.

The young mule died last August from tetanus. I am now using an old mule from Hope, but she is too old for the work and should be replaced by a younger animal.

Since the sad disaster of January 14th, the garden has been used as a camp for the homeless, but they have now all left the garden.

The garden is in a most deplorable condition and will take some time to get it into order again. There are quantities of bricks, zinc sheets and rubbish to be cleared away. The walks have been badly cut up and will all need repairing.

I have applied to you for a large quantity of ornamental foliage and flowering plants from Hope Gardens to replant the borders as soon as the weather conditions are favourable.

The broken fences round the enclosures have already been repaired.

During the encampments several Bib-cocks were destroyed. These have been replaced by new ones obtained from the Kingston General Commissioners.

One new twelve inch lawn mower was purchased during the year.

One grafted E. I. Mango plant was planted in the garden on May 24th, being held as Arbor Day, by Mrs. Bourne, wife of the Colonial Secretary, before a large number of school children and their parents.

One large Ficus Benjamina died and was cut down.

## KING'S HOUSE GARDEN.

Mr. W. J. Thompson is Superintendent of King's House Garden and Grounds, and the following paragraphs are taken from his Report:—

On April the 9th I was transferred from my position as Travelling Instructor and Superintendent of the Parade Garden, Kingston, to take up the duties as Superintendent of these gardens and grounds.

In addition to keeping the garden clean and watered, attending to the plants in the nursery and house, cutting flowers for the house, &c., the following work has been done.

A new dildo fence has been erected at the East gate.

The roads and walks have been repaired as funds would allow but they all need to be reformed.

The shrubs in the borders have been pruned, manured and watered as needed.

The bush behind the borders has been billed and cleared out.

Some of the Ficus trees have been pruned.

The lawns and verges have been kept weeded and billed.

Six new beds have been formed and planted with such plants as Allamanda, Russelia, lilies of kinds, Gardenias, Poinsettias, &c.

The plants in most of the old beds on the lawn have been taken up, the ground trenched and the plants re-planted.

A collection of native orchids have been fixed on growing posts and have become nicely established.

Several of the trees on the lawn have had clumps of imported orchids attached to them.

A large number of old tree roots have been either dug or burnt out.

A piece of ground north east of the King's House has been cleaned of old bush and trees and the ground replanted with grass and a bed for rock plants formed.

A piece of land south of King's House has been cleared of a number of trees and shrubs, a new walk formed and the remainder of the ground planted with Bahama grass.

The grass embankment around the ball-room has been dug up, lowered six inches and replanted with grass.

The old large Ficus tree growing by the ball-room has been removed.

Several large trees and old shrubs have been cleared away from the East gate, the ground planted with Bahama grass and a hedge of Aralia and Acalypha planted.

The old plants have been taken from one of the beds in the rose garden, the ground trenched and young rose plants planted. The rest of the rose beds have been forked, nut-grass taken out and the ground manured; the roses have also been pruned as required.

A lot of young pine suckers have been planted in the old pine ground and a new bed has been prepared and planted with suckers.

Six new taps and 100 feet of piping have been fixed.

An open gutter, 600 feet long has been made to carry off the water from the lily tank.

The pastures have been cleaned once at the expense of His Excellency Sir J. A. Swettenham and once at the expense of the garden.

Sixty chains of fencing have been refixed and some of the other fencing repaired as funds would allow.

All the field gates have been re-fixed on new posts.

Thirty chains of wire netting have been fixed on part of the race course fence.

The piece of land in one pasture which has always been used as a place for throwing tins, &c., has been cleaned and the rubbish thrown in the gully.

Two carts have been repaired, two sets of harness bought and garden hose, tools, &c., bought.

The earthquake of January 14th, did very little damage to the garden itself.

I have, &c.,

W. FAWCETT, Director.

The Honourable The Colonial Secretary.

## APPENDIX I

### LIST OF PLACES VISITED BY THE AGRICULTURAL INSTRUCTORS, MESSRS. W. CRADWICK AND J. BRISCOE.

*Demonstrations by Travelling Instructors.*

Demonstrations were given by Mr. Cradwick at the following places:—

Portland—Port Antonio.

St. Mary—Port Maria (2), Retreat (2), Oracabessa (2), Hampstead (3), Richmond (2), Hamilton Mountain, Islington, Preston, Highgate, Annotto Bay, Mt. Angus.

St. Ann—Browns Town, Endeavour, Somerton, Madras, Watt Town, Moneague, Lime Hall, Runaway Bay, Gibraltar, Epworth, Watsonville, Bellvue, Waltham, Concord, New Hall, Dromilly, Harmony Vale, Beechamville, Clarksonville, Mt. Moriah, Aboukir, Borobridge, Devon, Macedonia, Bamboo, Thatchfield.

Clarendon—Four Paths (2), Brixton Hill (2), Richmond Park, Thompson Town, Chapelton Meairs, Mocho.

Trelawny—Deeside, Wales, Hague, Western Faval. Clark Town, Stewart Town, Wakefield Duan Vale (2), Browns Mt., Mt. Lebanon, Duncans, Kinloss, Warsop, Troy, Albert Town, Low River, Ulster Spring, Stewart Town, Falmouth.

St. James—Cambridge (2), Hazelymph, Montego Bay, Bogue, Porters Mountain, Mt. Edmondson, Waldon, Adelphi (2), Mt. Carey, Mt. Reece, Catherine Mount, Ducketts, Hopewell, Catadupa.

St. Elizabeth—Ipswich, Mulgrave (2), Elderslie, Siloah (2), Aberdeen (2), Newton (2), Thornton (2), Appleton, Ginger Hill, Lacovia, Santa Cruz (2), Newmarket (3), Carmel, Giddy Hall, Green Valley, Top Hill (2), Pedro Plains (2), Black River (2), Kensington, Long Hill, Carisbrook, Joint Wood, Cameron Hill.

Westmoreland—Springfield, Retrieve (2) Water Works, (2), Shaftston, Townhead, Sav.-la-Mar, Petersfield (2), Lambs River, Mt. Eagle, Georges Plain, New Hope, Little London, York, Townhead, Bethel Town, Darliston, Paradise, Glen Stuart.

Hanover—Kew Park, Chester Castle, Bickersteth, Lambs River, Copse, Lucea (2), Greensland (2), Haughton Court, Riverside, Cacoon (2), Askenish, Maryland, Lethe, Montpelier, Jericho, Kendal, Brownsville, Gurnay Mt., Pondside, Knockalva, Blue Hole, Cornwall Mountain, Borneyside.

Manchester—Mandeville, Barossa, Christiana, Kendal, Waltham, Kirkpatrick, Hillside, Plowden, Broughton, Cocowalk, Woodlands, Blue Mt., Davyton, Albion, Plinlimmon, Hanbury, Porus, Mile Gully, Auchembeddie.

Demonstrations were given by Mr. Briscoe at the following places:

St. Andrew—Stony Hill (5), Mt. James (4), Chancery Hall (4), Cavaliers (5), St. Christopher (6), Port Royal Mtns. (2), Mt. Charles (3), Lawrence Tavern (5), Cambridge (5), Industry (3) Golden Spring (5), Temple Hall (3), Tom's River (3), Red Hills (3) Burnside (3), Mannings Hill (6), Mountain Spring, Cypress Hall, Rock Castle, Belvidere (2), Shooters Hill, Happy Grove (2), Mount Patience, Mt. Salas (2), Bellevue, Brandon Hill, Clifton (4), Stirling Castle (4), Gordon Town, Guava Ridge (2), Maverly (3), Tunbridge, Swallowfield (2), Smiths Pen (2), Airy Castle (2), Mt. Airy, Mt. Moses, Hagley Gap, Woodford (2), Peters Rock (2), Harmony Hall, Molynes, Water Course, Pleasant Valley, Pembroke Hall, Ben Nevis.

St. Thomas—Trinity Ville (5), Yallahs (5), Easington (2), Bull Bay (3), Cedar Valley (3), Blue Mountain Valley (2), Morant Bay (4), Lyssons (3), Port Morant (4), Bowden, Monklands (3), Wakefield (3), Jones Pen (2), Mt. Lebanus, Greenfield (3), Richmond Vale, Oxford, Retreat (2). Bath (2), Prospect (3), Georgia (2), Marley, Hallhead, Coley (2), Serge Island (2), Mt. Vernon (2), Æolus Valley (2), Bull Bay, Phillipsfield (2), Norris (2), Fair Prospect, Potosi, Rhine, Rockbrook, Batchelors Hall, Albion Somerset, Merely.

## APPENDIX II.

### PLANTS RECEIVED.

#### FOREIGN DONORS.

Dr. A. Robertson-Proschowsky, Nice, France.
Prof. C. S. Sargent, U.S.A.

### SEEDS RECEIVED.

#### LOCAL DONOR.

Miss Stennett, Liberty Hall, St. Ann.

#### FOREIGN DONORS.

Director, Royal Gardens, Kew
Sir Thomas Hanbury, La Mortola, Ventimiglia, Italy
Directeur de la Villa Thurêt, Cap d'Antibes
Lady Blake, Ceylon
Ministere des Colonies, Jardin Colonial, Nogent Sur Marne (thro' Sir J. A. Swettenham)
Director, Instituto Agronomico, Sao Paulo, Brazil
“ Botanic Gardens, Singapore
“ “ New South Wales
“ “ Melbourne, Victoria
“ “ Brisbane
“ “ Hong Kong
“ “ Buenos Ayres
“ “ British Guiana
Supt. Botanic Gardens, Trinidad
“ “ Station, Antigua
“ “ “ Nassau, Bahamas
Dept. Interior Bureau of Forestry, Manila, Philippine Is.
Municipal Gardens, Cape Town
Supt. Botanic Gardens, Mysore (Bangalore), India
Agri-Horticultural Society, Madras, India
Arnold Arboretum, Harvard University, Mass., U.S.A.
Messrs. Dammann & Co,, Italy
Mr. R. W.Hodges, Essendon, Victoria, Australia
Mr. A. S. Archer, Antigua
Mr. J. M. Purves, Zomba, British Central Africa
Mr. Jno. W. Gordon, Alajuela, Costa Rica
Mr. C. V. Powell, Agri. Dept., Nairobi, British E. Africa
Mr. Wm. S. Lyon, Bureau of Agri., Manila. Philippine Is.
Mr. M. Herb, Naples
Mons. Pittier

## APPENDIX III.—METEOROLOGICAL TABLES.

### HOPE GARDENS—Elevation 668 feet.

| **MONTH.** | Pressure. | | Temperature. Degrees Fahrenheit. | | | | | Dew Point. | | Humidity. | | Rainfall–Inches. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7 a.m. | 3 p.m. | 7 a.m. | 3 p.m. | Max. | Min. | Range. | 7 a.m. | 3 p.m. | 7 a.m. | 3 p.m. | |
| | In. | In. | ° | ° | ° | ° | ° | ° | ° | | | |
| 1906. | | | | | | | | | | | | |
| April ... | 29.946 | 29.856 | 71.0 | 83.1 | 86.4 | 69.6 | 16.8 | 66.0 | 67.5 | 84 | 58 | 5.13 |
| May ... | 29.921 | 29.868 | 73.9 | 82.6 | 87.6 | 73.8 | 13.3 | 69.8 | 72.2 | 87 | 93 | 12.91 |
| June ... | 29.905 | 29.868 | 74.3 | 79.3 | 86.7 | 72.4 | 13.8 | 70.4 | 74.2 | 73 | 84 | 11.70 |
| July ... | 29.962 | 29.878 | 74.0 | 87.4 | 91.6 | 75.5 | 16.1 | 67.5 | 74.2 | 81 | 65 | 1.84 |
| August ... | 29.922 | 29.870 | 73.1 | 85.1 | 90.8 | 73.4 | 18.4 | 68.7 | 74.8 | 87 | 69 | 3.65 |
| September ... | 29.868 | 29.828 | 73.1 | 81.7 | 88.9 | 72.6 | 15.3 | 68.7 | 77.5 | 87 | 84 | 14.17 |
| October ... | 29.874 | 29.820 | 71.1 | 83.3 | 88.9 | 70.5 | 18.4 | 66.2 | 75.9 | 90 | 79 | 7.59 |
| November ... | 29.878 | 29.817 | 71.3 | 81.7 | 86.3 | 71.0 | 15.3 | 66.0 | 69.3 | 84 | 65 | 4.38 |
| December ... | 29.977 | 29.987 | 65.8 | 80.0 | 84.0 | 65.4 | 18.6 | 60.3 | 57.8 | 81 | 47 | 0.04 |
| 1907. | | | | | | | | | | | | |
| January ... | 29.959 | 29.953 | 63.2 | 79.9 | 83.9 | 62.6 | 21.3 | 58.2 | 65.2 | 83 | 60 | 0.14 |
| February ... | 29.997 | 29.873 | 64.3 | 77.7 | 82.8 | 62.7 | 20.1 | 58.6 | 68.0 | 83 | 72 | 1.77 |
| March ... | 30.011 | 29.872 | 65.4 | 80.5 | 85.2 | 65.3 | 19.9 | 59.0 | 72.4 | 81 | 76 | 0.26 |
| Means ... | 29.935 | 29.874 | 70.0 | 81.8 | 86.9 | 69.5 | 17.2 | 65.1 | 70.7 | 83 | 71 | 63.58 |
| | | | | | Mean = 78°.6 | | | | | | | |

### CASTLETON GARDENS—Elevation 496 feet.

| **MONTH.** | Temperature. Degrees Fahrenheit. | | | | | Dew Point. | | Humidity. | | Rainfall–Inches. |
|---|---|---|---|---|---|---|---|---|---|---|
| | 7 a.m. | 3 p.m. | Max. | Min. | Range. | 7 a.m. | 3 p.m. | 7 a.m. | 3 p.m. | |
| | ° | ° | ° | ° | ° | ° | ° | | | |
| 1906. | | | | | | | | | | |
| April ... | 67.4 | 78.9 | 84.3 | 67.4 | 16.9 | 65.9 | 72.3 | 93 | 81 | 8.33 |
| May ... | 69.9 | 81.7 | 85.8 | 70.1 | 15.7 | 68.1 | 68.0 | 93 | 62 | 13.29 |
| June ... | 71.1 | 81.9 | 86.1 | 71.1 | 15.0 | 67.5 | 69.5 | 90 | 67 | 8.10 |
| July ... | 70.8 | 84.7 | 88.7 | 70.4 | 18.3 | 69.9 | 76.7 | 96 | 77 | 4.83 |
| August ... | 70.4 | 82.6 | 88.1 | 70.3 | 17.8 | 68.6 | 76.0 | 96 | 78 | 8.78 |
| September ... | 70.3 | 80.7 | 87.0 | 70.3 | 16.7 | 68.5 | 74.8 | 93 | 82 | 16.24 |
| October ... | 69.8 | 79.6 | 85.9 | 69.6 | 16.3 | 68.0 | 74.3 | 93 | 82 | 11.96 |
| November ... | 69.6 | 79.2 | 83.7 | 69.6 | 14.1 | 68.7 | 72.7 | 96 | 79 | 30.83 |
| December ... | 67.7 | 76.7 | 79.5 | 67.3 | 12.2 | 64.6 | 67.0 | 90 | 71 | 7.29 |
| 1907. | | | | | | | | | | |
| January ... | 65.5 | 75.9 | 79.2 | 65.5 | 13.7 | 64.2 | 67.1 | 96 | 73 | 10.49 |
| February ... | 62.5 | 75.8 | 79.9 | 62.5 | 17.4 | 61.5 | 68.1 | 96 | 76 | 7.01 |
| March ... | 64.0 | 78.3 | 82.1 | 64.8 | 17.3 | 62.1 | 69.4 | 93 | 70 | 0.93 |
| Means ... | 68.2 | 79.6 | 84.2 | 68.2 | 15.9 | 66.4 | 71.3 | 94 | 75 | 128.08 |
| | | | Mean = 76°1 | | | | | | | |

HILL GARDENS.—Elevation 4,907 feet.

| MONTH. | * Pressure. | | Temperature. Degrees Fahrenheit. | | | | | Dew Point. | | Humidity. | | Rainfall—Inches. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7 a.m. | 3 p.m. | 7 a.m. | 3 p.m. | Max. | Min. | Range. | 7 a.m. | 3 p.m. | 7 a.m. | 3 p.m. | |
| 1906. | In. | In. | ° | ° | ° | ° | ° | ° | ° | | | |
| April ... | 25.218 | 25.211 | 60.2 | 63.9 | 67.4 | 55.4 | 12.0 | 55.8 | 59.5 | 83 | 86 | 8.29 |
| May ... | 25.221 | 25.211 | 62.2 | 64.6 | 68.4 | 57.0 | 11.4 | 58.1 | 55.8 | 86 | 81 | 14.87 |
| June .. | 25.189 | 25.194 | 62.5 | 66.6 | 69.6 | 58.5 | 11.1 | 59.3 | 62.8 | 86 | 81 | 14.55 |
| July ... | 25.247 | 25.281 | 63.5 | 68.3 | 73.1 | 58.8 | 14.3 | 58.0 | 64.2 | 80 | 87 | 2.99 |
| August ... | 25.224 | 25.218 | 63.3 | 66.8 | 71.5 | 58.3 | 13.2 | 57.7 | 63.5 | 83 | 90 | 8.85 |
| September ... | 25.204 | 25.182 | 63.5 | 65.8 | 69.4 | 58.8 | 10.6 | 60.2 | 63.6 | 86 | 90 | 22.95 |
| October ... | 25.190 | 25.167 | 62.9 | 65.8 | 69.8 | 58.1 | 11.7 | 58.1 | 61.7 | 83 | 87 | 8.37 |
| November ... | 25.190 | 25.168 | 62.2 | 65.2 | 68.8 | 57.3 | 11.5 | 57.3 | 62.1 | 83 | 90 | 20.38 |
| December ... | 25.229 | 25.222 | 56.5 | 61.5 | 64.4 | 51.0 | 13.4 | 46.9 | 55.9 | 69 | 80 | 7.67 |
| 1907. | | | | | | | | | | | | |
| January ... | 25.260 | 25.232 | 56.8 | 59.8 | 65.8 | 50.2 | 15.6 | 52.5 | 58.2 | 74 | 96 | 2.45 |
| February ... | 25.250 | 25.206 | 56.7 | 60.2 | 62.7 | 51.0 | 11.7 | 55.1 | 57.9 | 93 | 93 | 5.30 |
| March ... | 25.231 | 25.221 | 55.9 | 64 5 | 68.3 | 52.2 | 16.1 | 51.6 | 52.1 | 88 | 65 | 1.85 |
| Means ... | 25.221 | 25.205 | 60.5 | 64.4 | 68.2 | 55.5 | 12.7 | 55.9 | 59.8 | 83 | 86 | 118.52 |
| | | | | | | Mean = 61°.8 | | | | | | |

* The Barometer pressures are reduced to standard at Kew, 32°, and gravity at Lat. 45°.

# ISLAND CHEMIST.

*Report of the Island and Agricultural Chemist for the year ended 31st March, 1907.*

In continuation of the course adopted in the report of last year the work of the Governmen Laboratory is presented under the three headings :

1. Analysis.
2. Agricultural Education.
3. Agricultural Research.

## I.—ANALYSIS.

1. During the year ending 31st March 1907, 856 samples have been dealt with as compared with 1,213 samples in the previous year and an average of 723 samples for the five years ending 31st March, 1906.

This falling off corresponds with a reduction in the output of work by the Laboratory for the year for which several causes were responsible. For six months the services of an Assistant Chemist were not available owing to changes of staff, for four months the Chemist was absent on leave after five years service, while the changes of staff necessitated by the resignation of the Lecturer in Agricultural Science, the Fermentation Chemist (on completion of his engagement) and of two assistants in the Sugar Department considerably handicapped the work of the Laboratory. Lastly the earthquake of the 14th January seriously crippled the resources of the department for the last quarter of the year.

*Summary.*

| | 1905-6. | 1906-7. |
|---|---|---|
| A—Official ... | 102 | 104 |
| B—Agricultural ... | 193 | 64 |
| C—General ... | 49 | 82 |
| D—Sugar Experiment Station | 869 | 606 |
| Total for the year .. | 1,213 samples | 856 samples. |

*Details 1906–7.*

A. OFFICIAL.

*Police.*

| | |
|---|---|
| Human Viscera— | |
| 1 Arsenic, 6 nil | 7 |
| Animal Viscera— | |
| 1 Strychnine, 1 nil | 2 |
| Blood stains | 5 |
| Substances for poison— | |
| 3 Ground Glass | |
| 1 Mercuric Chloride | |
| 7 Phosphorus | |
| 1 Abortive | |
| 13 Nil | 25 |
| Counterfeit coinage | 14 |
| Petroleum | 2 |
| Customs— | |
| (Chiefly alcoholic) | 37 |
| Foods and Drugs— | |
| 5 milks | |
| 2 drugs | |
| 5 foods | 12 |
| Total official | 104 |

B. AGRICULTURAL.

25 Soils
8 Foodstuffs
16 Cassavas
10 Milks
5 Fertilisers
Total Agricultural 64

C. GENERAL.

51 Waters
27 Minerals and ores
4 Miscellaneous

Total General 82

D. SUGAR EXPERIMENT STATION.

173 Cane Juices
2 Molasses
12 Sugars
119 Rums
162 Distillery Products
87 Seedling Canes
14 Miscellaneous
37 Waters for Bacteriological Analysis

Total Sugar Experiment Station 606

Grand Total for the year 856

2. *Official analyses*—Of the seven cases in which human viscera were submitted for analysis poison was only found in one instance, that of an infant child poisoned by its mother and grandmother. Both women were convicted of murder at the Falmouth Circuit Court. Rat

poison in the form of Phosphoric paste or Arsenical powder was employed in eight instances for poisoning food and drink. Ground glass and corrosive sublimate were also found.

I have again to observe that the Adulteration Law remains practically a dead letter and that there is no organised attempt being made to check the purity of the food and drink sold to the public.

3. *Agricultural analyses*—The work on soils has been steadily prosecuted, some 25 samples having been received during the year. The starch value of cassava is still being tested in connection with the field trials at Hope. A marked increase in the content of Hydrocyanic acid in the cassavas from Colombia after four years acclimatisation in the Liguanea plain of Jamaica has been observed. These varieties when first introduced by Mr. Robert Thomson were found to be almost devoid of Hydrocyanic acid but now exhibit the normal content for a sweet cassava as grown in Jamaica.

The milk of a herd of half bred Zebu cattle was tested and found to compare favourably with that of the imported Holsteins, particularly in the content of Proteids.

4. *General analyses*—These show a marked increase for the year due to the unusual number of waters and copper ores that have been submitted for analysis.

A regular system for testing the crude and filtered water at each of the three filtering stations of the Kingston General Commissioners has now been put in operation.

The Bacteriologist conducts a monthly test while chemical analyses are made quarterly. It is satisfactory to be able to report that the standard of efficiency in the filtration at Hope and Constant Spring is now higher than before and that the bacterial purification of the supply is exceedingly good. It is evident that a carefully controlled system of sand filtration is capable of providing the City with a water supply of a high order of purity.

Considerable activity has been displayed during the past year in testing the possibilities of copper mining in Jamaica. The Clarendon mines are now being tested by an American expert and shipments have been made of ores of good grade. The prospects appear to be good and it is expected that a good deal of copper ore will be mined during the next few years.

5. *Sugar Experiment Station analyses*—In addition to the free analysis of any materials which sugar planters send to the Laboratory for analysis, the chemical control of all the field experiments with sugar canes at Hope and on estates has been carried out. A good deal of time has been spent in the study of the High Ether process and its commercial application to various classes of Jamaica rum. A systematic control of the ether content of the rum crop produced on four estates was maintained.

## 2—AGRICULTURAL EDUCATION.

6. Seven students attended the course of study in Agricultural Science during the period under review. Of these five presented themselves for the Diploma Examination of the Board of Agriculture and were all successful.

| | | |
|---|---|---|
| L. L. Carrington | ... | First Class |
| C. S. Lindo | ... | Second Class |
| S. M. Dailey | ... | do. |
| P. L. Irving | ... | do. |
| T. U. Dixon | ... | do. |

Professor J. P. de Albuquerque of Barbados who examined reported favourably upon the work sent in.

Mr. L. L. Carrington completed the course in one year and displayed ability, The four students in the second class took over two years in preparation but started with a very imperfect preliminary training. The students deserve credit for this result and have shown that even backward students are able to achieve success by making good use of their opportunities and by hard work.

7. The examination for the Agricultural Scholarships in December produced a better field of candidates than the previous competition last year when only one candidate attained to scholarship standard. This year five candidates attained to the standard and the three scholarships were awarded as follows :—

1. O. L. Crichton, Montego Bay Secondary School
2. J. Angus do.
3. A. H. Harty, Jamaica College

The two students who attained to scholarship standard and were next in order of merit were :—

4. G. L. Gibbs, Wolmer's School
5. E. F. Bailey, Mannings Free School

The work of the two boys from Montego Bay was particularly good and showed that special attention had been given to the teaching of Elementary Science at that school.

Owing to the disaster in January the year's work, about to commence, had to be postponed and in consequence of the damaged state of the buildings at Hope it was eventually found necessary to abandon the course for a year. This set back is greatly to be regretted and the inconvenience to students and their parents must also be deplored.

8. The usual Agricultural Course for the teachers was in session at the Mico under favourable conditions when the earthquake occurred. Mr. E. J. Wortley was engaged in giving the course of lectures in Agricultural Science.

In August he gave a four weeks' course to the students at Bethlehem College. The lecturer has continued to give the usual lectures to the Agricultural Students and has given instruction in Agricultural Science at the Mico, Shortwood, and St. Josephs Colleges.

9. The special course for distillers was held in August at which the following gentlemen attended :—

1. Mr. D. D. Peterkin, Hillside, Distiller
2. Mr. H. R. Milliner, Manchester, Proprietor
3. Mr. J. A. Fowles, Lodge, Overseer
4. Mr. A. Mackenzie, Copse, Distiller
5. Mr. W. J. Fenton, Belleisle, Distiller
6. Mr. A. S. Gray, Orange Valley, Overseer
7. Mr. V. G. Holle, Catherine Hall, Distiller
8. Mr. J. D. Martin, Bog, Distiller
9. Mr. C. G. Muirhead, Pusey Hall, Manager

The course lasted for three weeks and included lectures by the Fermentation Chemist, Superintendent of Field Experiments and the Island Chemist. A laboratory course and practical work in the experimental distillery were also provided.

I have received several letters from those who have attended these courses stating that they had found practical benefit from the information they had received.

## AGRICULTURAL RESEARCH.

### A.—FIELD EXPERIMENTS.

*Sugar Canes*—Manurial Experiments have been carried out in conjunction with Soil Analysis on the following Estates during the past year :—

| *Parish.* | *Estate.* | *Director.* | |
|---|---|---|---|
| St. Ann | Richmond | Fred. Clarke | Esq. |
| | 2 Series | | |
| Trelawny | Long Pond | Geo. Taylor | " |
| | Green Park | Fred. Chambers | " |
| Clarendon | Denbigh | Geo. Muirhead | " |
| | Moneymusk | T. Harty | " |
| | Parnassus | T. Grant | " |
| Westmoreland | Friendship | T. Thomas | " |
| | Blue Castle | Samuel Morris | " |
| | Shrewsbury | Ed. Morris | " |
| | George's Plain | W. Woolliscroft | " |

Experiments to test Comparative value of Seedling Canes with the ordinary estate canes have been established as follows :—

| *Parish.* | *Estate.* | *Director.* | |
|---|---|---|---|
| Westmoreland | Shrewsbury | Ed. Morris | Esq. |
| | Fontabelle | Hon. W. A. S. Vickers | |
| | George's Plain | W. Wooliscroft | Esq. |
| | Mt. Eagle | A. R. Burgess | " |
| | Blue Castle | Samuel Morris | " |
| | Mint | Chas. Clarke | " |
| Trelawny | Long Pond | Geog. Taylor | " |
| | Vale Royal | H. Steel | " |
| Clarendon | Morelands | F. M. Ellis | " |
| | Pusey Hall | T. Campbell | " |
| | Sevens | T. Grey | " |
| | Parnassus | T. Grant | " |
| | Bog | C. G. Muirhead | " |
| | Denbigh | Geog. Muirhead | " |
| | Amity Hall | T. Sharpe | " |
| | Moneymusk | T. Harty | " |
| St. Ann | Richmond | Fred. Clarke | " |
| | Llandovery | A. J. Webb | " |
| | Cave Valley | L. H. Harpen | " |
| St. James | Hampden | D. O. Kelly-Lawson | " |
| | Fairfield | J. Kerr Daly | " |
| | Dundee | A. S. Grey | " |
| Hanover | Copse | J. McKenzie | " |
| | Kew | A. Charley | " |
| St. Elizabeth | Appleton | J. M. Farquharson | " |
| | Holland | H. Dalley | " |
| St. Thomas | Serge Island | I. Mordecai | ' |

### SMALLER EXPERIMENTS.

| *Parish.* | *Estate.* | *Director.* | |
|---|---|---|---|
| Westmoreland | Llandilo | Hugh Clarke | Esq. |
| | Sweet River | S. Clarke | “ |
| Trelawny | Freemans Hall | W. Forbes | “ |
| | Western Favel | Guy Ewen | “ |
| | Manchester Pen | J. R. Milliner | “ |
| | Christiana | J. Barclay | “ |
| | Orange Valley | W. Kerr | “ |
| | Oxford | P. Sewell | “ |
| St. Catherine | Hartlands | C. A. T. Fursdon | “ |
| | Industry | J. Dillon | “ |
| | Colbeck | G. D. Rowe | “ |
| | | W. H. Reens | “ |
| | School Garden | J. S. Fraser | “ |
| St. Ann | Huntley | H. Levy | “ |
| | Tobolski | R. L. Young | “ |
| | Retirement (School Garden) | | |
| St. Mary | Rio Magno | N. Rudolf | “ |
| | Martinique | J. N. Sutherland | “ |
| St. James | Iron Shore | H. Hewitt | “ |
| | Montpelier | A. Aarons | “ |
| St. Andrew | Shortwood (School Garden) | | |

### SUGAR CANES AT THE EXPERIMENTAL STATION.

The eight acres of canes at Hope which are grown for the Sugar Experiment Station are under my direction and the arrangement has worked satisfactorily.

Of the 101 varieties of canes grown at the Gardens which were tested at the Laboratory in 1902, 46 were abandoned, and 12 new Seedlings from Barbados and Demerara were added. These 67 varieties were tested as plants in 1905 and again as ratoons in 1906. As a result of this trial 27 more varieties were discarded, and the selected 40 together with 18 new acquisitions were planted out in 100 and 30 hole plots and cut in February last. We have now discarded 22 more varieties, and of the 131 canes tested we now retain 34 as worthy of further trial. These consist of 7 named varieties (of which 5 are retained for purposes of comparison only) 16 Demerara Seedlings and 11 Barbados Seedlings.

### JAMAICA SEEDLING CANES.

None of the Seedlings raised in 1901 and 1902 proved to be of value. In 1903 operations were started on a larger scale and of 500 Seedlings 40 were selected for trial. These have now been grown as plants and ratoons and again as first ratoons and some of the Seedlings outclass any other canes at present growing at Hope. Of the 1904 Seedlings 15 have shown themselves superior to the White Transparent, up to 82 per cent., at the first trial, and are being tested on a larger scale, while the ratooning powers are also under observation.

While the 1904 Seedlings were raised from seed from Demerara Canes, those of 1905 are presumptive hybrids of certain Barbados varieties (B. 208, B. 156, B. 306, B. 347) with the White Transparent obtained from the experiment announced in my first report on Seedling Canes in 1902.

As was anticipated these Seedlings do not show an increase in Sucrose content over the White Transparent, but are marked by a greater vigour of growth and should yield a larger return of Sugar per acre.

This work has been carried out under the supervision of Mr. P. W. Murray, Superintendent of Field Experiments, whose zeal has enabled a larger increase in the number of Sugar Cane Experiments to be carried out with improved accuracy.

The Foreman and Superintendent at Hope have assisted us in every way, and it is satisfactory to find this work progressing so favourably. An increase of 2 acres to the cane land, making 10 acres in all, has now been sanctioned.

During the past year 103,965 cane-tops (mostly of B. 208) have been sent out to Estates. Some very encouraging results from the growth of B. 208 have been obtained, while B. 147 has proved a splendid cane for heavy soil in Trelawny under dry conditions.

### BANANAS AND OTHER CROPS.

The experience of the past six years has shown that in the majority of cases fertilisers are either not required or not profitable under the Agricultural conditions obtaining in Jamaica in the cultivation of such Crops as Bananas, Coffee, Citrus Fruits and Pineapples.

We have therefore abandoned manurial experiments on crops other than Sugar Cane for the present. It is significant of the independence of the Banana Cultivators of any artificial fertilisers for the production of this crop, that although carefully regulated plots were established for five years in succession on several important plantations, in no case were any detailed, account of the returns from the plots recorded. In the case of Sugar Cane plots, the Superintendent can supervise the application of the manures and the weighing of the canes when cut, while with Bananas a weekly record of grade and numbers of bunches cut from each plot is requisite if any commercial data as to the financial outcome of the manuring are to be obtained. It is obvious that this can only be done by the planters themselves who are on the spot. When Banana lands are exhausted the problems of manuring will acquire considerable importance. For the present, I am satisfied that all of our lands that are at all suitable for Banana cultivation only require Humus and Drainage to produce the best results. The drain on the soil from growing a crop of Bananas is apparently small so far as Nitrogen and Phosphates are concerned, while the large reserves of Potash in the soil suffice for the full requirements of the crop.

### B.—INVESTIGATION OF JAMAICA RUM.

This work which was started in 1903 by the appointment on a three years' contract of Mr. C. Allan, B.Sc., as Fermentation Chemist to co-operate with the Laboratory staff in the investigation of Jamaica Rum has reached the first stage in its progress by the completion of Mr. Allan's period of service.

At the outset practically nothing was known as to the composition of the materials used and of the changes which occurred during the process of fermentation employed in the manufacture of Jamaica Rum, and Mr. Allan carried out a valuable piece of work in securing information on these points.

He was able to establish the general principle upon which the fermentation of the various products was based and to show clearly that the "flavour" of Jamaica Rum to which the great variety in character and quality of our island spirits is due was the result not of alcoholic fermentation by yeasts but to acidic and putrefactive fermentations by bacteria.

This is a fact of prime importance in the scientific study of Rum manufacture, and a further study of the chemical composition of Jamaica Rums indicated that the compound ethers are the chief source of the special aroma on which the commercial value depends.

Mr. Allan summarised the results of the experiment that had been made in the Laboratory, the Experimental Distillery and on Estates in a course of lectures wheh he gave to the Distillers in October. These are to be published as a part of a general publication on Jamaica Rum for the use of our Distillers which is now in preparation.

In November Mr. S. F. Ashby, B.Sc., late Carnegie Research Fellow and Bacteriologist at the Rothamsted Experimental Station was appointed to take up the combined duties of Bacteriologist and Fermentation Chemist. Mr. Ashby is devoting himself to the isolation and study of the individual organisms at work in Estates' materials and to the investigation of the comparative value for alcohol production and flavour of the yeasts and other organisms thus obtained.

It is hoped that during the next three years some valuable discoveries capable of affecting favourably the productive power of our Distilleries will result from these labours.

The High Ether Process as invented by me for reinforcing the Ether Content of rum by recovering the volatile acids left in the spent liquor from the retorts and returning them into the process was carried out on a commercial scale on six estates during the crop.

On three estates making a common clean rum the process was systematically carried out to increase the standard of ethers and the whole crop was carefully regulated to a uniform standard about fifty per cent. higher than that otherwise obtainable. As the materials employed were identically those resulting from the fermentation in each case, the result was simply that of an intensification of the normal flavour of the rum without altering its character. The rums were sold in London and favourably reported upon by brokers and merchants as improved in quality. The manager of one estate gave me figures showing a net profit of £200 on the season's operations under the process applied in this way.

It was necessary to keep this enterprise secret owing to the baseless and ill-informed prejudices of brokers and others in the rum trade against the new process. It was ignorantly supposed to be a process of chemical adulteration, and some London brokers even declared their belief that sulphuric acid was a necessary ingredient of rum produced under the process.

It should be understood that nothing passes into the rum which is not normally present, and that the use of lime to combine with the acids in the lees to enable a solid residue to be recovered by evaporation and the subsequent liberation of the acids by the addition of the requisite amount of sulphuric acid to the lime or salts, simply results in a sediment of inert sulphate of lime which is removed by filtration and the practical result is that volatile acids produced by fermentation and at present wasted are recovered and returned into the process to increase the output of ether natural to the rum in question.

It should also be understood that the process does not create flavour or impart a high flavour to a common rum but is merely a convenient practical means of reinforcing the normal flavour of a rum as resulting from the products of the fermentation by which it was produced.

On three Estates the process was tried on an Estate scale with high-flavoured or German Rums. In one case although the rum was sold at a higher price, the general management of the fermentation was unsatisfactory and the yield so poor that the Distiller was dismissed and a reversion to the old method was decided upon. The poor yield was in no way due to the process, but to attempts to produce a superior flavour and to provide the requisite supply of acid material for the production of a high ether rum, whereas in view of trade prejudices it was decided by the management to make a rum of ordinary ether standard.

This experiment threw no light on the merits of the process as applied to a high flavoured rum, and I am satisfied from experience that under favourable conditions of management the financial outcome should have been encouraging.

At Hampden Estate an excellent plant for operating the whole production of the distillery under the high ether process was erected. Thirty puncheons of rum varying but slightly from a uniform standard of 3,500 parts of ethers as against 900 for the ordinary liquor rum and 300 for the low wines rum was produced. This product was boycotted by the merchants and brokers in Jamaica and London and was finally reported upon as "commercially unsaleable" by the London agents of the Estate.

It was considered valuable by some buyers in Germany but they were afraid to buy it because some expert pronounced it to be flavoured with chemical essences. The outlook for the proprietor of Hampden Estate who had taken up this experiment with great zeal and had carried out the process with extraordinary skill and success was so discouraging that I decided personally while on leave to enquire into the matter in England and in Germany in the course of my enquiries into the Rum Trade.

Having obtained a fortnight's extra leave on half pay I visited London, Glasgow, Hamburg, and Bremen with introductions from the Customs and the Foreign Office which enabled me to interview traders as an accredited government officer. It is gratifying to be able to report that all the rum was sold as a result of this effort and that the bulk of the thirty puncheons was sold for 8s. per gallon. It was evident that the large holders of stocks of the ordinary "German" or "Export Quality" rums viewed with apprehension a process for increasing the blending value of Jamaica rums as likely to depreciate the value of old stocks. Again, the standard of ethers in this rum being four times that of the ordinary make caused the concentrated rum to be viewed with suspicion as an artificial essence.

This experiment proved that the whole output could be turned into a rum at 3,500 ethers from the same materials now producing a rum averaging about 700 ethers (liquor and low wines rum together). In other words the process is capable of increasing the ether content of a "German" rum five-fold.

It must be noted that the fermentation and materials were not interfered with in any way.

The financial results on the process rum were most encouraging, but it is to be regretted that the rum made by the old process after the concentrated rum was reported unsaleable at any price in London, realised poor prices and I cannot help thinking was deliberately underpriced in London as a result of trade prejudices.

The commercial bearings of this matter are very complicated and some years will be required before the real merits of the case can be decided.

A very interesting experiment was carried out on an Estate in Vere making a common clean rum. In this case a special fermentation of flavouring materials for making acids was set up separately and this was distilled separately so as to obtain the volatile acids. These were then introduced by my process into the ordinary common clean materials and a rum was obtained of about 2,000 ethers that sold for 5s. 6d. per gallon. This was tested by blenders on the Continent and found so satisfactory that a large order was sent which could not be filled owing to crop having been completed. This is the most remarkable demonstration of the ether theory yet obtained. Rum was raised from 2s. 3d. to 5s. 6d. a gallon simply by increasing the ethers and developing a suitable fermentation of flavouring material for the supply of the volatile acids.

At the wish of the two Planters' Associations Patents have been taken out in my name for the benefit of the Sugar Experiment Station should the Patents possess a commercial value, in the following Countries:—

| | |
|---|---|
| United Kingdom | Trinidad |
| Cuba | Barbados. |

As the process is applicable to Whisky and Brandy it is possible that it might find use for reinforcing the ether content of these spirits, and that Royalties might be obtained from the foreign rights under the Patents.

## PUBLICATIONS.

The following papers reporting upon the work of the Laboratory and its staff have been produced during the year.

Cassava Trials, III. Bulletin Dept. of Agriculture.

*For The West Indian Agricultural Conference.*

1. Seedling Canes in Jamaica.
2. The rational use of Fertilisers for Sugar Cane in Jamaica.
3. Jamaica Rum.
4. Some problems of Agricultural Education in Jamaica.
5. The Industrial Prospects of Cassava Starch.
6. Soil Organisms and the Nitrogen Cycle by S. F. Ashby, B.Sc., Fermentation Chemist.
7. The teaching of Elementary Science and Agriculture in the Schools by E. J. Wortley, Lecturer in Agricultural Science.
8. The School Garden as an Educational Medium by P. W. Murray, Supt. of Field Experiments.

Only one of the eight papers prepared for the West Indian Agricultural Conference was actually read owing to the Earthquake, but they are all to be published in the Bulletin of the Imperial Department of Agriculture.

## EXTRA RECEIPTS.

The revenue of the Laboratory from fees and miscellaneous receipts has been as follows :—

| | | £ | s. | d. |
|---|---|---|---|---|
| Fees for Analysis | ... | 70 | 6 | 6 |
| Students Fees | ... | 26 | 6 | 6 |
| Miscellaneous | ... | 3 | 6 | 1 |
| Sale of Apparatus | ... | 0 | 10 | 0 |
| Total Receipts | ... | £100 | 9 | 1 |

## STAFF.

The Chemist went on leave of absence from July to November 2nd after 5½ years continuous service without leave, Mr. C. Allan, B. Sc., acting as Island Chemist. No other officer received leave during the year.

Mr. E. J. Wortley having been appointed Lecturer in Agricultural Science on 1st May, 1906, the office remained vacant until the arrival of Mr. R. Simmons, A.I.C., to take up the appointment on a three years' agreement.

Mr. G. D. Goode, Second Assistant, was promoted and placed in charge of the accounts in December, 1906, Mr. R. B. Harris acted as temporary clerk from July to October.

Mr. S. F. Ashby was appointed to the combined offices of Government Bacteriologist and Fermentation Chemist in July and after making a special study of Yeasts and Water Bacteriology at Copenhagen and London arrived in the Island to take up his duties on the 16th November.

Mr. N. A. Rudolf, B.S.A., Lecturer in Agricultural Science, resigned his appointment and was succeeded by Mr. E. J. Wortley, on the 1st May.

Two Apprentices, H. Dalley and H. Gammage, left the Island during the year. The former is doing well as manager of a Distillery in Central America, while the latter emigrated to the United States. Two Apprentices are now in process of training.

## EARTHQUAKE DAMAGE.

The remarkable way in which the walls and structure of the Laboratory withstood the severe shock of the 14th January is highly creditable to the Public Works Department for the sound work they secured.

The damage to walls was almost nil, and £5 should cover the small structural repairs required to make good the damage.

As regards the Glass, Apparatus and Chemicals, however, severe losses occurred which I estimate at about £300. A fire broke out from the promiscuous mixing of acids, chlorates, Sodium and Phosphorus, and it was still burning when the Chemist reached the Laboratory at 5 p.m. Fortunately it was kept under and by sunset all risk of the destruction of the building by fire was over.

It is with gratitude that I record that no member of the Laboratory Staff was hurt by the disaster and that our material losses were so slight in comparison with the general experience. The Staff were employed in special salvage work after the Earthquake and certain junior members earned the hearty thanks of the Hospital and City Authorities for their services.

H. H. COUSINS, Island Chemist.

20th June, 1907.

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